PROCEEDINGS

OF THE

THIRTY-FIRST ANNUAL MEETING

OF THE

FLORIDA STATE HORTICULTURAL SOCIETY

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1918

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CONTENTS

List of Members ---- V
Address of Welcome, W. P. Franklin ---- 11
Response, Dr. J. H. Ross ---- 11
The Blight of Autocracy, Dr. Calvin H. French ---- 15
President's Annual Address, H. Harold Hume ---- 24
The Fertilizer Situation from the Standpoint of the Citrus Grower, A. L. White ---- 27
The Year's Developments in the Fertilizer Industry, W. J. Schubert ---- 33
Avocado Varieties, Leo B. Scott ---- 40
Avocados, Lloyd S. Tenny ---- 47
The Tangelo, T. Ralph Robinson ---- 52
The Drying of Vegetables, Harriette B. Layton ---- 56
Canning and Why Can, Mrs. Dora R. Barnes ---- 61
Florida Feeding Herself, Lucy Cushman ---- 65
Avocado Diseases, H. E. Stevens ---- 67
Community Spraying, Max Waldron ---- 74
The Care of Spraying Machinery, W. W. Yothers ---- 77
The Treatment of Cloth to Prevent Mildew, Morrill and Yothers ---- 81
Scaly Bark, A Disease of Citrus Trees, C. D. Kime ---- 86
The Black Fly, Wilmon Newell ---- 90
The Pruning of Citrus Trees, C. W. Smith ---- 97
Bringing Back the Grove Injured by Cold, G. M.Wakelin ---- 99
Protecting the Grove from Cold, A. M. Tilden ---- 101
The Market News Service of the Bureau of Markets, United States Department of Agriculture, in Florida, F. W. Read ---- 110
Why Co-operative Marketing Frequently Fails, S. C. Kelly ---- 116
Labor for Groves and Packing Houses, W. A. Dopson ---- 119
The Marketing of Citrus Fruits in the Early Days, F. M. Leonard ---- 126
Early Days at Citra Florida, A. S. Kells ---- 128
Reminiscences of a Pioneer Orange Grower, H. B. Stevens ---- 130
Council of State Defense, P. H. Rolfs ---- 141

System in the Nursery, F. M. O'Byrne ---------- 148
A Performance Record and Bud Supply Department, Leo B. Scott ---------- 155
Irrigation Problems in the Ft. Myers Section of Florida, F. W. Stanley ---------- 159
New and Rare Plants for Florida Gardens, H. Nehrling ---------- 161
Sweet Peas in Florida, Mrs. R. D. Hoyt ---------- 167
The Use of Chayotes and Dasheens, and Their Culture, J. E. Morrow ---------- 169
Some Features of Tomato, Egg Plant and Pepper Culture, C. D. Sherbakoff ---------- 176
The Popular Pepper and How to Produce It, John Boring ---------- 181
Peaches in Florida, B. E. Stall ---------- 183
Peaches, Plums and Pecans, Jasper C. Carter ---------- 184
Necrology ---------- 186
Annual Reports, Election of Officers, Selection of Meeting Place ---------- 188
Final Resolutions ---------- 195

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Warner, S. C., East Palatka, Fla.
Warriner, C. G., 410 Chestnut St., Arlington, N. J.
Watkins, P. C., Sharnes, Fla.
Watson, E. E., Ft. Myers, Fla.
Weeks, Robt. H., Ft. Myers, Fla.
Weigel, Miss Mary T., Omaha, Neb.
Weiland, Chas., Estero, Fla.
Weissinger, J. F., Aripeka Saw Mills, Citizens Bank Bldg., Tampa, Fla.
Wells, J. E., 807 A. St., S. E., Washington, D. C.
Wetzler, Frank C., 310 Lewis Ave., Toledo, Ohio.
Wheaton, W. J., 45 Hoyt Place, Rochester, N. Y.
Wheeler, H. J., 92 State St., Boston, Mass.
Whidden, W., Useppa Island, Fla.
Whipple, Herbert G. Kissimmee Fruit Co. 220 Broadway, New York, N. Y.
White, A. L., Ft. Myers, Fla.
Whittle, C. A., E. 14th St., Atlanta, Ga.
Wightman, L., Box 576, Tampa, Fla.
Willett, N. L., 849 Broad St., Augusta, Ga.
Williams, S. F., Jacksonville, Fla.
Williamson & Dennis, Jacksonville, Fla.
Wilmshurst, H. J., DeLand, Fla.
Wilson, Garwood, 2819 N. Coney St., Philadelphia, Pa.
Wilson, R. N., Riverside, Cal.
Wilson, W. N., Gainesville, Fla.
Winchester, E. L., Boynton, Fla.
Winston, J. R., Orlando, Fla.
Winter, Henry, Cheltenham, Pa.
Wirt, R. D., Crooked Lake, Fla.
Witte, E. L., 166 E. Ave. 53., Los Angeles, Cal.
Witte, P. C., 195 Hodge St., Buffalo, N. Y.
Wolfe, Earle A., 515 Berne Ave., Bemidiji, Minn.
Woodruff, Hamilton, The Mapes Formula & Peruvian Guano Co., Box 1154, Jacksonville, Fla.
Woodruff, W. A., R. F. D., No. 5, Benton Harbor, Mich.
Woods, L. R., Gulf Fert. Co., Tampa, Fla.
Worden, L. P., Winter Haven, Fla.
Wright, Edgar A., Tampa, Fla.
Wright, Mrs. Edgar A., Tampa, Fla.
Wyman, Dr. W. E. A., Box 211, Tampa, Fla.

Yarnell, C. A., Crooked Lake, Fla.
Yarnell, I. A., 300 La Salle Bldg., Minneapolis, Minn.
Yates, Jas. G., Port Tampa City, Fla.
Yonson, Chris, Marco, Fla.
Youmans, D. S., Ft. Myers, Fla.
Young, Chas. Bayshore Blvd., Box 21, Tampa, Fla.
Young, Geo. F., McKinley, Isle of Pines, Cuba.
Youngman, Dr. Andrew J., 5817 Grodois Ave., St. Louis, Mo.
Yount, Andrew H., 11 Chalmers Place, Chicago, Ill.

Zachar, Jerome, Mayakka City, Fla.

1038 members Ohio yr

Proceedings of the Thirty-First Annual Meeting of the Florida State Horticultural Society

The Thirty-first Annual Meeting of the Florida State Horticultural Society convened in the beautiful city of Fort Myers on April 23, 1918. While the attendance was not as large as usual it was an enthusiastic meeting. The genial hospitality of the people of Fort Myers, the spirit of good fellowship that prevailed among the members, the many good papers read and the beautiful natural surroundings all combined to make the meeting a most enjoyable one, and one that will long be remembered by those in attendance.

The keynote of the meeting was war service. The Wednesday evening program was transferred, and a Liberty Loan rally was held under the auspices of the Society to encourage the people of Lee County to meet their quota of the Third Liberty Loan. The stirring appeals of President Hume and others resulted in subscriptions totaling more than $10,000.

The Society is much indebted to Mrs. Lloyd S. Tenny for the excellent conservation program arranged by her; and to Mrs. T. Ralph Robinson for the report of the Committee on Ornamentals. An exhibit of food products and the demonstration of the preparation of vegetables for drying, conducted by Mrs. Tenny and Misses Layton and Cushman was not only of great interest, but very instructive.

The Society has enjoyed an unusually prosperous year. This is due in no small measure to the work of Mr. Russell Kay, the chairman of the Membership Committee, supported by the Florida Grower. The advertising campaign conducted by them resulted in a substantial increase to the membership. A vote of appreciation was given them at the business session on Thursday evening.

Perhaps the most important change made by the Executive Committee during the year was in the form of the publication issued by the Society. At the February meeting it was voted to publish a Quarterly, instead of the annual publication, to be issued in January, April, July and October. The April number is to contain the announcements of the annual

meeting; the July number, the complete report of the proceedings of the annual meeting; and the other two numbers, original articles of timely interest.

The Quarterly publication started with Volume 31. The first issue was published in April. It was a double number, being Nos. 1 and 2 of the new volume, and contained the program and announcements of the annual meeting. The present number has been unavoidably delayed in publication. The last number of the volume will be issued in October, and will contain a resume of our present knowledge concerning the protection of groves from cold in Florida.

Two important committees were added this year to the usual list of Standing Committees. They were the Committee on Membership and the Committee on History. As usual, the burden of the work fell upon the chairmen of these committees. The fine work of Mr. Russell Kay as chairman of the Committee on Membership has already been mentioned. Mr. F. M. O'Byrne, chairman of the Committee on History, unselfishly devoted a considerable amount of time and effort in interesting the older members of the Society in the work of his committee. The three excellent papers in this number are some of the results of his labors.

The meeting adjourned on Thursday night. Orlando was selected to be the 1919 meeting place.

Address of Welcome

W. P. Franklin, Mayor, Ft. Myers, Fla.

I assure you it is a very great privilege to extend a welcome to such an audience and to such a Society—a Society that means so much to our State. To welcome its thirty-first annual meeting means a great deal for Fort Myers. We appreciate its meeting with us at this time, this being the first time we have thus been honored, if I am correct. We assure you that everything within the City of Fort Myers and everything within Lee County is yours while you are in our midst. We welcome you, we greatly welcome you. If there is anything we can do for you while you are with us, anything that is not particularly mentioned, just ask for it and it shall be given.

We welcome each one of you individually. We welcome you as a Society. The keys of the City are turned over to each one and all of you. Use them as you see fit, and if there is anything you cannot unlock, send for the Mayor; he has a master key which will do the job. I thank you. (Applause.)

RESPONSE

Dr. J. H. Ross, Winter Haven, Fla.

The only regret I have at this moment is that I am not gifted with the eloquence to fittingly reply to the welcome which your Mayor has spoken. We took it for granted, when we were invited to visit your town, that we would be welcome, and we have come with a feeling that the invitation sent to us was cordial and genuine, and represented the feeling of the people of this delightful city.

And now the Mayor has done more than a host usually does. As a general rule, when you visit your friends you take what is set before you and ask no questions, and good politeness would prompt you to appear to be entirely satisfied with what is offered you without asking for anything in addition. But the Mayor has gone the entire limit, and has put no restrictions upon us, either for the things seen or those not seen. He has assured us it will be the pleasure of the people of Fort Myers to give us all we ask for. I can hardly imagine a more cordial welcome than that.

The Society has reason to have a very

friendly feeling for Fort Myers, and we have done at least one thing which should make that feeling reciprocal. The Society met at Palm Beach last year, and was most cordially entertained, and the Secretary of their Board of Trade showed us many courtesies. The very moment the Society decided the meeting should be held at Fort Myers in 1918, the Secretary resigned and came right here to Fort Myers. (Laughter.) I understand he has recently resigned his position here as Secretary. And while I am not advised at this time as to where he is going, I am pretty sure I can name the place just as soon as our election for the next place of meeting is over. (Laughter and applause.)

Our Society, representing especially the horticultural interests of Florida, has other reasons for being very well pleased with Lee County and Fort Myers. It was just a year ago in this month when some of us were in Tallahassee trying to secure from the Legislature of the State funds to continue the work of eradicating the citrus canker. At that time the committee having that matter in charge came back to the Society for instructions. I remember the loyal and spontaneous support we had from you on that occasion; and I desire to say that, when we were in Tallahassee and our cause appeared to be in a most critical state, there never was a moment when we did not have the championship of your Representative, Mr. Perry, and your Senator, Dr. Fogarty. (Applause.) They could always be counted upon, and we relied to a considerable extent upon them for guidance and advice in the things we were doing there. That alone has placed this Society under obligations to this County.

It is proper you should know something of the visitors you are entertaining, and whether they are worthy of your hospitality. I may say to you, Mr. Mayor, and the good people of Fort Myers, that this Society is the organized expression in Florida of the oldest industry in the world. The ancient lineage of people is sometimes set down to their credit. If that counts for anything, I may say we are worthy of the hospitality so freely offered us, because we represent the very oldest industry in the world.

You remember the story of the creation, when the Great Builder had finished the heaven and the earth, and the animals, and man and his companion, and given them dominion over the beasts of the earth and in the seas; then He went out and planted a garden. Some think it was a grove. I am inclined to think it was an orange grove. Then He put our first parents into the garden; not only to eat the fruits thereof, but that they might tend that garden. So you see the profession of horticulture began the second week of creation; and Adam and Eve were the first horticulturists and were put in charge of the only grove in existence at that time.

So we come to you with the advantage of an ancient and honorable occupation. I do not know of anything that is more baffling in its complexities, that requires more skill and courage than this same business of horticulture.

I have said before at our meetings,

that if one wants to get into a position where he is nearer the Divine Throne than anywhere else in this universe, it is only necessary for him to own an orange grove in Florida. Then, unless there is something warped in his makeup, when he is working in his grove in the golden sunshine of a balmy Florida day, he can hear the angels sing. I know of nothing that will draw perversity and the disposition to wrong doing out of man's nature more than work in such a delightful occupation.

But when we thought the angel of peace had spread its wings over the world, and that discord could never again come among men, the nation we had thought most advanced in learning and in civilization, that nation, from the dizzy height to which it had gone, fell into insanity and abrogated to itself the divine right to regulate the destinies of all men and all nations; and, my friends, the people who do the things in this great Republic of ours can never submit to be the vassals of military autocracy; never, so long as there is one of us alive. (Applause.)

And so we find the whole world engaged in the greatest war that the history of man unfolds. And I may say that the conduct of that war in defense of our rights and liberties, in the defense of democracy and self-determination of nations as to how they shall be conducted, is the paramount duty of every man, woman and child in this Republic. (Applause.)

All of us know that, though the European nations, our allies, have fought gallantly and will continue to fight with undiminished courage as long as there is a single soldier left to fight, in the final analysis, America must win this war if it is to be won. (Applause.) For three long years Great Britain and France have struggled and exerted every power they had against the most powerful foe ever known, and their resources are nearly spent. The enemy is not defeated by any means; and this Republic must now assume the burden which we have so willingly taken, with our untouched resources and our undiminished man-power, bring success to the armies dedicated to the principles for which we fight. (Applause.)

We in Florida do not raise cereals, but we do raise potatoes and many things that the other parts of the country want. This Society, more than any other organization in the State today, has the opportunity of contributing to the self-support of Florida and to the aid and help of the nation. It is well that we should do this rather than to be a dependent and consumer of the things that are necessary to the support of our country and our allies and our armies. May we assume this burden as a Society, and each one of us individually dedicate ourselves to the service of our country as willingly and as fully as our boys who go to fight the enemy in France or Belgium or Italy! We cannot do less.

And so we come to you tonight, a Society of food producers. And I do not know of any greater privilege that has ever come to any society than to aid production in this great test of principles.

It is most gratifying to drive through the State, as I do, and see that in connec-

tion with almost every grove there is a cornfield, small or large, a potato patch, a vegetable garden; and let me tell you that the membership of this Society is doing its part to carry out the great work in which we are engaged.

And so we come to you tonight, explaining to you what we are and what we aspire to do, in order that you may feel sure that the cordial welcome you have extended to us has not been misplaced. We are not going to abuse your hospitality, but enjoy it to the utmost. We thank you again for your kind welcome. (Applause.)

The Blight of Autocracy

Pres. Calvin H. French, Rollins College, Winter Park, Fla.

If we were not in the midst of the Great War, my address would naturally deal with some subject of local or general interest in a manner which might stimulate your optimism and encourage you to greater efforts in the upbuilding of your particular enterprises. But we are not meeting under ordinary circumstances. Our nation stands with her allies in the midst of the greatest and most terrible war of all human history. Its shadow is over all that we do. Upon its results will depend the character of the world's civilization as far into the future as we can see or think. Nothing that we hold dear, either in our common life as a people, or in our personal hopes and endeavors, will be safe unless we and our allies win the war and win it in decisive fashion.

In extending his invitation to me to address you, your Secretary was kind enough, in view of these conditions, to say that I might deal with the war situation, as it affects every one of us. He stated your desire that the necessity for common sacrifice, even to the utmost, in the interest of the most transcendent national and international need might be impressed. If we lose the war, nothing that we may do here will have any value or significance. If we lose the war, now or in the near future, we must accept Prussian overlordship, the exaction of huge indemnities, the imposition of economic slavery and the destruction of all our hopes of a free and independent national life. A Prussian "place in the sun" will mean the darkening of all the world for every other nation and people. I think, therefore, that I may phrase my subject in a manner which will point us to the present world crisis, and at the same time, call our attention to the relation between that crisis and our own particular enterprises. May I ask you, then, to think of *The Blight of Autocracy?*

You know, to your cost, the insidious diseases which spread through your gardens and orchards and groves, destroying the fairest prospects and defrauding you of the fruits of the labors of months or years. Through many generations such a disease has been preying upon the life of a great people. The malignant germ of a false philosophy long ago found lodgment in the thoughts of the German people. It was generated by the desire to justify a motive of primitive savagery. Propagating itself in the spirit and thought of the nation, it has sent the Prussian raging through the world like a savage, evil beast set free among unpro-

tected men and women. Against such an enemy reason and diplomacy offer no defense. The bonds of civilization have power only over those who are civilized. To the nation in which the passions of savagery are let loose, those bonds are only bonds of straw. Therefore, America, under the leadership of her President, has joined with the other great and free peoples of the world to use force, force to the utmost to the end that the evil disease which has made of one people a mad and ravaging beast among the nations—may be destroyed, and government of the people, for the people and by the people, may not perish from the earth.

You will permit me to use your own methods in diagnosing this malignant disease of the nations. When your fruit is blighted and your trees begin to die, you carry twigs and branches and specimens of fruit to the laboratories, and there you study them with the aid of the microscope and the methods of chemical research. You are not so much concerned with the blackened, blighted fruit as with the hidden worm or the unseen insect and the conditions which permit it to destroy your fruit. So, while we must destroy our enemies' armies and ships, if we can, our chief concern is with the motive and the philosophy which grew and bore fruit in great military establishments and their use in war, "the violent quarrel of the nations."

Responsibility for the world's calamity must rest on the heads of those who lead in Germany. A laboratory analysis of German history reveals four things which must be said in explanation of what Germany's leaders are and have done.

First, a spirit and motive of primitive savagery are clothed in the forms of modern civilization.

Secondly, the State so formed is justified and defended by an opportunist philosophy.

Thirdly, the theories and purposes of such a state are propagated by a subsidized and prostituted system of education.

Fourthly, the state, with its theories and programs, is now incarnated in an absolute and ruthless autocracy.

In the development of civilization, men do things and then seek to explain and justify them. Therefore, systems of philosophy come after the event and seek to explain systems of government. Frederick the Great, though he left no direct heir to his throne, became the father of German political practice and philosophy. Scarcely had he ascended his throne when he provoked a war with Maria Theresa. She had spurned his offer of support in gaining the throne of Austria at the price of yielding to him the province of Silesia. The peace of Breslau, two years later, gave Prussia the province which Frederick desired and made him the idol of his people. Through the next twenty years, Prussia grew as a jungle tiger grows, "red in tooth and claw" with the blood of her weaker neighbors.

In handing over his crown to his weak and foolish nephew, the old warrior said in shameless justification of his aggressive wars: "Remember, once for all, that in the matter of kingdoms, he catches who can; and that there is no wrong but in the case of being forced to return them." "To make one's self respected and feared by one's neighbors," he said again, "is the

very summit of high policy. This end is to be achieved by two means. The first is to have a real force and effectual resources; the second is, to make the most of the strength one has."

"As to politics," he said, "I understand, my dear nephew, that we are ever to try to cheat others. It is the way to have the advantage, or, at least, to be on a footing with the rest of mankind. Now this principle being once settled, never be ashamed of making alliances, and of being yourself the only party that draws an advantage from them. Do not commit that stupid fault of not abandoning them whenever it is your interest to do so; and especially maintain vigorously this maxim, that stripping your neighbors is only to take away from them the means of doing you a mischief."

When such a politician turns his thoughts to religion, we need not be surprised to hear him say: "The true religion of a prince is his interest and his glory. He ought, by his royal station, to be dispensed from having any other." And again: "Should it be necessary to make a treaty with other powers, if we remember that we are Christians, we are undone; all would be over with us; we should be constantly bubbles. As to war, it is a trade in which the least scruple would spoil everything, and, indeed, what man of honor would ever make war, if he had not the right to make rules that should authorize plunder, fire and carnage."

A century and a quarter later these theories and practices of Frederick the Great find almost exact reproduction in the words and administration of General von Bissing as Governor General of Belgium: "If we do not hold Belgium, administer Belgium in future for our interests, and protect Belgium by force of arms, our trade and industry will lose the position they have won in Belgium, and perhaps we will never regain them." Frederick's maxim with regard to the treatment of a conquered people is repeated in only less brutal language by von Bissing when he says: "The advantages which we have been able during the present war to obtain from Belgian industry, by the removal of machinery and so on, are as important as the disadvantages which our enemies have suffered through lack of this addition to their fighting strength." The violation of Belgium, the destruction of Rumania and Servia and the pitiless massacre of Armenia are the direct and logical fruitage in modern German life of the precepts and practices of Frederick the Great.

Ancient savagery, clothed in the forms of modern civilization and armed with all the weapons which modern science can forge, is only a more savage and dangerous beast which must be slain if liberty is safe. *Until liberty is safe, and the principles of democracy have been established in the place of Hohenzollern autocracy, this youngest and greatest of the world's democracies will continue to offer on the altar, for the sake of human freedom, her treasure, her sons and her sacred honor.*

But we must not fight as those that beat the air. Our enemy is more than armies and fleets. He is intrenched in the hearts of more than sixty millions of people, and

he is defended by a system of education and a philosophy carefully planned and taught through more than three generations.

There is no more interesting or instructive chapter in the history of any modern nation than that which tells of the resistance of Germany after the first Napoleonic war. The peace of Tilsit, in 1807, deprived Prussia of more than half of both her territory and her population. The beautiful Queen Louise, in writing to her father, said: "We have gone to sleep on the laurels of Frederick the Great. From Napoleon we can learn much, and what he has accomplished will not be lost. It would be blasphemy to say 'God be with him,' but evidently he is a tool in the hand of the Almighty with which to bury what is old and lifeless, closely as it may be welded to the things around us."

It was from the burial of old abuses and through the breathing of a new spirit into the life of the people that a new Prussia arose. In Berlin, in the same building which was used as barracks for French soldiers, with French spies in his audience and the sound of French boots and drums outside on the Unter den Linden, John Gottlieb Fichte, the philosopher, delivered his Addresses to the German Nation. So lofty were his ideas and so clothed in philosophical language, that the French censor saw no harm in them and permitted their publication. Little did he dream that they would be a bugle call to a national renaissance. They reached the hearts of a people borne down by the weight of a foreign yoke and suffering the shame of a humiliating defeat. Years afterwards, when Prussia had passed through the valley of her humiliation and had come again into power, Napoleon said: "It was not the German army that defeated me, but the German ideologists, Fichte and his kind."

Among all the losses which befell Prussia through the peace of Tilsit, none was felt more bitterly than the loss of the University of Halle. Immediately after the blow fell, a plan was laid before the king proposing to establish a high school in Berlin. Then the "Providential man" for Germany appeared in William von Humboldt. Being put in charge of the Bureau of Education, he did two tremendously important things. He reorganized the schools in a manner which ultimately removed their control from the church and vested it in the state, and he founded the University of Berlin.

"What we desire in the government we must first put into the minds of the people through the schools," he said. Among those who laid the foundations of modern Germany, none builded better than Humboldt. When, in 1809, four years before Napoleon's first great defeat and six years before Waterloo, he established the University of Berlin, he began the forging of the sharpest sword in all the Prussian armory. In its first faculty were Fichte, Schliermacher, De Wette, Wolf, Buttman, Neibuhr and others whose names are only less familiar. More than four hundred students gathered the first year to receive instruction. Fichte kindled in their hearts a lofty patriotism. Wolf aroused their passion for vengeance

upon a ruthless invader. Neibuhr taught them the lessons of Roman power and military organization. Every member of that faculty represented the Prussian state. The schools must exist for the state. They are state institutions, supported by the state in the interest of the state. It was upon this fundamental principle that Humboldt reorganized the educational system of Prussia and founded the University. Since 1848, every teacher in the higher schools and universities of Prussia has taken the following oath: "I swear to God, the Almighty and Omniscient, to be submissive, loyal and obedient to His Royal Majesty, King of Prussia, my most gracious lord; to fulfill all the duties of my office according to the best of my knowledge and belief, and also faithfully to observe the constitution. So help me God."

Need we wonder that the German university has been called the most important institution in Germany? The members of its faculties are the leading factors in the development of the mental and spiritual life of the people. For good or ill, the university is the core not only of the intellectual life, but of nearly everything that shapes the nation's ideals. It is a center of research work for imperial ends. Only the Jesuits, and perhaps not even they, have surpassed Prussia in moulding and using a system of education for the accomplishment of certain definitely chosen ends.

What are the ends which Prussian education proposes? To see them clearly we must go back again to the days when a new Prussia arose after the final overthrow of Napoleon. That rebirth of national spirit which enabled a defeated and humiliated Prussia to cast off the yoke of Napoleon might, with more favorable conditions and better direction, have made of Germany a great democracy instead of a ruthless autocracy masquerading under the forms of constitutional government.

But whatsoever seed of philosophy a nation sows, that shall it also reap. Modern German political philosophy is the harvest, many times gathered and replanted, of seed sowing begun by George William Frederick Hegel. He followed Fichte in the University of Berlin, and during the years of Prussian reconstruction, his teaching has been called the Prussian state philosophy.

"Only the whole of a thing is real," he said. "The partial fact is only an abstraction which needs to be brought into connection with the whole in order to gain validity." As a philosophical abstraction, to be thought of and taught in a university classroom, to most of us such a statement would seem somewhat like the item of news of which Mark Twain said, "It might be important, if true." But when it is translated into the terms of social and civil life, it has a more startling sound. "Only in society do men really exist, really win the actual attainment of selfhood and individuality," said Hegel again. The individual has no value in himself.

When he applied this doctrine to citizenship and the state, his teaching became still more disturbing to those who hold to the ideals of democracy. "The state," he said, "is the true end of man, not merely

the means. The state exists for its own sake. All the worth which the human being possesses, all his spiritual reality, he possesses only through the state. Truth is to be found in the unity of the universal and subjective will; and the universal is to be found in the state, in its laws, its universal and rational arrangements. The state is the divine idea as it exists on earth. Only that will which obeys law is free; for it obeys itself."

Surprising as it may sound, I venture to say that in these quotations from Hegel we may find the real reason why we are now at war with Germany. Listen again to what he said: "The state exists for its own sake. The state is the true end of man, not merely the means. The citizen has no worth or significance except through the state. The state is the divine idea as it exists on earth."

From this beginning, by means of some necessary and many unnecessary implications, has been developed that Prussianism, against which all the free peoples of the world are now arrayed in an irrepressible conflict, which must go on until autocracy is forever banished from the earth.

Hegel, like many others, was a kind of *ex post facto* philosopher. As a member of the faculty of the University of Berlin, he was a creature of the Prussian state. As such, his first duty was to justify his creator. Through five generations, the Prussian state had been forming around the doctrine that the king received his crown from God alone.

The Great Elector, as he lay dying, gave this bit of practical philosophy to his weaker son. "The more parliaments you summon, the less authority you will have." This same son, Frederick I, when, in 1701, he was crowned the first "King of Prussia," found no bishop to pronounce God's blessing upon him. He had broken with England, and in those days bishops were obtained only in England. So small a thing as this, however, did not deter him. He himself created two bishops to serve on the occasion.

Having with his own hand placed the crown upon his own head, he called upon his own handmade bishops to certify to his divine appointment. Having thus assumed to know the divine will, and by his own action having relieved the Deity of any necessity of direct action in the matter, Frederick proceeded to exercise his divine authority to the full. At the marriage of his son, he wrote to his mother-in-law, saying: "The crown I will myself place on the head of the crown princess, for this she can receive from none after God but me." This same son afterwards said: "Salvation belongs to the Lord, but everything else is my affair."

Of such a kingdom Hegel was the creature. His philosophy must defend and justify a fiction of divine right strengthened by more than a century of belief and practice. German history since 1840 is the all-sufficient proof of his success.

Among his pupils during his later years was Otto Eduard Leopold von Bismarck. Building on the philosophic foundation laid by Hegel, Bismarck constructed a system of government which, under con-

stitutional forms, has thus far perpetuated the old autocracy. Like its predecessor, this system has produced its own *ex post facto* apologists.

In 1850 the Prussian Constitution was adopted. It provided for a hereditary king and two houses of parliament. The Hohenzollern king, appointed by God, alone possesses executive functions. The upper house of parliament consists of the adult princes of the Hohenzollern family, together with certain others chosen for life by the king. The lower house is composed of deputies voted for by Prussian men of twenty-five years of age or over. The few rich men who pay one-third of the taxes cast one-third of the votes. The larger number of well-to-do people who pay the second third of the taxes cast one-third of the votes. The many poor people who pay the last third of the taxes cast one-third of the votes. No measure becomes a law until it is approved by both houses of parliament and by the king.

What more complete realization of Hegel's philosophy could be imagined? The individual Prussian citizen was wholly and indistinguishably merged in the Prussian state. His vote in favor of some member of the House of Deputies, having been cast orally in the hearing of his rich landlord, there was absolutely no other civil function which he could exercise. His vote weighed only one-thousandth or one ten thousandth part as much as the vote of his rich landlord. The deputy for whom he voted, upon taking his seat, found that any measure which he might advocate was subject to an absolute veto by the House of Peers and by the king. Surely the only consolation which a citizen under such a constitution could have would be in the reflection that the individual has no value in himself, since the state is the true end of man and not merely the means.

The German Constitution, framed by Bismarck and imposed upon the German States by William I in 1870, includes all the essential provisions of the Prussian Constitution. The "King in Prussia" is the German Emperor. The upper house of the legislature, the Bundesrat, is composed of the hereditary princes of the German States, or persons appointed by them, and representatives from certain free cities. The King of Prussia appoints seventeen members of the Bundesrat and controls three from Alsace-Lorraine. Fourteen votes in the Bundesrat will prevent any change in the Constitution. The King and the Bundesrat may veto any measure passed by the Reichstag. Modern Germany is Prussia extended to the farthest boundary of the German States, and modern Prussia is a state founded upon the theory that might makes right; that kings and governments have no religion but their own interest; that the keeping of faith between states is not to be required. To the building of such a kingdom, Prussia has called her scientists, who have drawn upon all the forces and elements of nature to create the instruments of warfare. She has called her scholars, who have framed a political philosophy the completeness of which is equaled only by its baseness. For its defense and extension she has laid

great burdens of taxation and service upon her subjects.

And Germany believes that she has a high and holy mission to impose the blessings of her superior culture upon all the rest of the world.

Dr. Paul Conrad, pastor of the Kaiser Wilhelm Memorial Church in Berlin, said, in 1915: "We feel ourselves to be the bearers of a superior kultur. We have no doubt that a defeat of our people would retard by centuries the development of mankind."

The Kaiser, in his speech at the Imperial Limes Museum, Saalberg, in 1900, described the virtues of the German Fatherland, to which he said: "I hope it will be granted to become in the future as powerful and as authoritative as once the Roman world-empire was, and that, just as in the old times they said, *'Civis Romanus sum,'* so at some time in the future they will say, 'I am a German citizen.' "

Again, at Kiel, in the same year, he said: "Germany's greatness makes it possible for her to do without the ocean, but the ocean proves that even in the distance and on its farther side, *without Germany and the German Emperor, no great decision dare henceforth be taken.*"

Thus the German Emperor assumes to be the super-man who "has the right and duty to compel the whole of mankind. He is the master, armed with compulsion and appointed by God." America is beyond the ocean over which he was looking when he stood at Kiel in 1900. It was in his heart that the time should come when even here no great decision should dare be taken without Germany and the German Emperor. On October 22, 1915, he gave an interview to Mr. Gerard, our ambassador, in the course of which he showed great bitterness against the United States. "America had better look out after the war," he said. "I shall stand no nonsense from America after the war."

His close friend, Count von Goetzen, in a conversation with Major N. A. Bailey, at the close of the Spanish-American War, has stated the German program as related to America. This statement, frequently quoted, appeared first in the New York Tribune August 11, 1915. "About fifteen years from now," said von Goetzen, "my country will start her great war. She will be in Paris in about two months after the commencement of hostilities. Her move on Paris will be but a step in her real object, the crushing of England. Everything will move like clockwork. We will be prepared and others will not be prepared. I speak of this because of the connection it will have with your country. Some months after we finish our work in Europe we will take New York and probably Washington and hold them for some time. We will put your country in its place with reference to Germany. We do not propose to take any of your territory, but we do intend to take a billion or more dollars from New York and other places. The Monroe Doctrine will be taken charge of by us, as we will then have put you in your place, and we will take charge of South America as far as we want to. I have no hostility toward your country. I like it, but we have to go our own way. Don't

forget this, and about fifteen years from now remember it and it will interest you."

After nearly four years of war the German armies have not yet reached Paris. We do not think they can. But we stand this very moment at the crisis of the battle. The ravening beast among the nations is still unconquered. Wounded and desperate it may be, but still strong and raging. While it lives unconquered, we and all that we hold dear are marked to be its prey. But not for the sake of self preservation alone do we take our stand in the battle line beside bleeding, glorious France, sturdy, dauntless England, beautiful, pleading Italy. We, the youngest and freest of the great democracies of the world, would not stand afar off in safety while others die for liberty. But, with blended colors and mingled blood, we stand as our fathers stood at Bunker Hill, at Concord and at Lexington, ready, if need be, with others, to yield even the ultimate measure of devotion in order that liberty, justice and righteousness may be forever established among men.

President's Annual Address

H. Harold Hume

It has been said, and rightly, too, that the chief business of our country today is *war*. I cannot see my way clear to bring to you anything else than a war message at this, our opening meeting.

Ours has been a nation organized for peace. Mighty efforts have been directed entirely along peaceful lines and the record of achievement is one of which we may well be proud. Have we not had our Fulton, our Morse, our Bell, our Wright and our Edison? The first steamboat plied American waters. The first railroad train creaked its way over American rails on American soil. The telegraph and the telephone, which have annihilated space and distance, were first invented and used in America. The first automobile ran on an American road and the first aeroplane flew in American air. The phonograph is a product of genuine American ingenuity. The modern machinery which has made possible the planting, cultivation and harvesting of enormous areas of land the world over to feed its teeming millions are American inventions. Have we not really reason to be proud of these things? It is true that some of these and others which I have not mentioned have been used for the terrible and cruel purpose of destroying mankind; but, none the less, they are our contributions in their right use to the welfare and betterment of humanity, and it is not our fault that men have used them otherwise.

But in spite of our achievements in the way of peace, as I have already said, it is not possible for me to bring you other than a war message at this time. Whatever our occupation, whatever our habit of thought or living, war is the center of our national interest. There is no escaping it, even if we would. We awake to ask, "What is the news of the day?" And we lie down to rest, wondering what the morning will bring forth.

These things being true, it is true also that we are pitted against a foe that is vile, that is brutal, that is powerful, that is unscrupulous; and those things which we hold most dear, those things which we inherited from our forefathers, and must pass on uninjured, unsullied and intact to succeeding generations of Americans, are in danger; and we must depart from the ways of peace for a time, we must bend our every energy to the making of war; we must right about face in our ways of living, thinking and working. It is war, cold, remorseless, forceful. War to the hilt; war that asks no quarter, no compromise. War that the liberty which we hold dear may be saved to ourselves,

our posterity and the peoples of this world. Lincoln, referring to our own country, said, "This nation cannot exist, half bond and half free." And in this century it is equally true that this world cannot exist, half bond and half free.

There was a time when war was made by part of a population of a country. The able-bodied or adventurous spirits took up their muskets and went forth to meet the foe. They lived independently of those who were left behind. They foraged for their existence. But that is no longer possible. We are at war with every resource of field, forest, mine and factory; aye, with every resource of man, woman and child. No one who rejoices in the name of freeman can escape; and being a democracy, every one must needs come forward, cheerfully, voluntarily, to do his part.

The horticulturists, you, the members of this Society, in common with every other tiller of the soil, must orient yourself in harmony with the change or changing conditions. Your work, in common with every other sphere of activity, must be brought into line with the chief industry of our country—the making of war.

First and foremost we must save and use for further service the things which we have. Old harness, old plows, old implements, old clothes, must be made of further use. The new things for which we had planned and worked must be left as dreams for future realization. The new suit of clothes and the new pair of shoes must not be bought. It is a fact that when you buy a new pair of shoes today when you do not need them, you are taking a pair of shoes that belong on the feet of a soldier boy. And I, for one, do not want our soldier boys in France, either literally or metaphorically, to get "cold feet."

Our army needs the wool and the leather, and our government needs that we should lend it the money for the full prosecution of the war and the realization of our hopes. Show me the man today who is keeping his money back for personal things that he can get along without; show me the man who refuses to buy government bonds because he can get larger interest elsewhere, and I will show you the ingrate, the coward, the slacker, in partnership with and fit companion only for those against whom we fight.

We must not waste. We have been a nation of wasters. We are mending our ways, but waste still goes on; waste in grove and garden, waste in field and home. Only by personal care and in many cases by united community effort can these wastes be prevented. I wonder, for instance, whether some of the vegetable crops now growing in Florida fields, will go to waste? And I wonder, too, whether in the grocery stores this summer, cans of beans, tomatoes and other vegetables shipped here from other states, will be sold, while these same things are going to waste now. I wonder whether fruits of any kind in grove or orchard will go to waste this spring, and the answer must be—yes. And I wonder whether personal and community efforts might not help to change this order of things. And the answer again must be—yes.

Remember, always, that God helps those who help themselves, and saving the waste is one important way of helping ourselves.

We must labor with our own hands. The time has come in our midst when the man who does not with his own hands produce something to eat, if he is able, should be looked down upon. A new democracy is born in America, the democracy of daily toil and labor with our own hands. The time is here when every member of this Society must bend his effort to the end that he produce as nearly as possible, everything he consumes. In years past some of us have grown oranges and grapefruit, or celery and potatoes, and have bought everything else we consumed, even to the feed for the chickens and the hay for the mule. That condition must be changed. We must plan and strive and work that we may be self-supporting, not a burden upon the nation or some part of it.

We must produce. Our fruits, our vegetables, our every food product that we can bring from the soil are needed. Some, more than others, perhaps, but all are needed. We have a very large and ever increasing population engaged in the mechanics of war, the building of ships, the manufacturing of ammunition, of guns, of clothing, and of all the thousands of things necessary for our men in camp or trench, and for the men of our allies, our brothers in arms.

Our producing population is decreasing relatively. It calls for the greater effort on the part of those left on the soil to the end that production may not fall off. The labor problem is an acute and difficult one, but if every community will act as a unit, if every community will see to it that there is no idler in its midst, we will be a long way on the road to solving difficulties that stand in the way of production.

Never in the history of our country was there such an opportunity for service—for that service which will help ourselves and in so doing help our country. In our homes our women have the same opportunity. We have just emphasized the necessity for maintaining production and preventing waste. If waste is stopped, as it must be, our women must do their part in canning and preserving; taking care of a surplus, when there is one, to make good in the time of the short supply when it comes, as it most assuredly will come. This whole problem of furnishing food in uniform supply throughout the year is simply and only a problem of conservation by canning and preserving. Let no woman who can possibly do so, neglect her opportunities for great national service along these lines.

We sometimes think of labor as being hard; of the daily tasks as the humdrum of existence. But if we view these things in the right light, if we look upon them as a part of our rightful service, we lift them clear out and above into the realm of noble and patriotic service. The keynote of our national existence is sacrifice, and of our national expression, service. God help us.

The Fertilizer Situation from the View Point of the Citrus Grower

A. L. White.

One of the most important and essential elements in the successful production of citrus fruits is the intelligent use of fertilizers. The trees must be nourished if satisfactory returns are to be expected. All plant life, as well as animal life, requires certain indispensable chemical elements to feed upon. Citrus trees are no exception. The citrus tree responds more generously to good treatment probably, than any other fruit tree. It is this characteristic of the citrus tree that makes us love it. It is so dependent and grateful for any attention bestowed upon it. Neglect it, and, in exact proportion, the tree will resent it and be a corresponding disappointment to its owner; but love and nourish it and it will flourish, bloom and fruit most generously.

The important elements for successful citrus culture may be enumerated as follows:

First. Suitable land, properly located and prepared.

Second. Drainage and irrigation.

Third. Good stock, for which we must depend largely upon the nurseries.

Fourth. Cultivation.

Fifth. Fertilizing.

The first four conditions may be fulfilled according to the best approved standards, but if the fifth is neglected, the net effort, generally speaking, will be a failure. Of course it is necessary to spray for fungi and insect pests, to properly gather, grade and pack the fruit for market; and lastly to sell through the most efficient selling organization in existence, the test of which is the greatest net returns to the grower and the absolute certainty that these returns will be paid, and paid promptly—which the writer firmly believes is The Florida Citrus Exchange.

It is evident that even if all conditions for successful citrus culture are fully complied with, except fertilizing, the effort will be a failure. Therefore, let us consider briefly the question of fertilizing.

I may state as an axiom that the natural fertility of soils suitable for citrus groves varies; that is the soils vary in their content of certain essential elements. It must, therefore, follow that in the absence of these essential elements, they must be supplied or added to the soil in the proportion in which they are absent. I am only speaking of available elements in the soil, as elements not available are pratically absent if they are not made available. In a broad sense any practice, such as the addition of any fertilizing material, or-

ganic or inorganic, the inoculation of the soil with bacteria to aid nitrification, the growth of legumes, the addition of stable manures, as well as ordinary commercial fertilizers, may come under the general head of fertilizing. But in this paper I shall confine myself mostly to the subject of the use of ordinary commercial fertilizers, and more especially under present war conditions.

It is generally understood and accepted that the three indispensable elements to be provided for in the development of the citrus tree and fruit, are nitrogen, phosphorus and potassium. They are usually spoken of as ammonia NH_3, phosphoric acid P_2O_5, and potash K_2O. No soil, however fertile in one or more of these chemical elements, contains them all in sufficient quantity, or in proper proportion. The logical procedure is to ascertain the quantity of each element necessary for the fullest development of the fruit, and the available quantity of each in the soil and supply the difference to the soil. The problem theoretically is simple, but practically most difficult. The equation contains too many unknown quantities that refuse to be eliminated. It does not admit of an exact solution, but, like most practical problems, an exact mathematical solution is not necessary.

Fortunately for us, experience in the grove and scientific determinations in the laboratory have furnished us an approximate solution by which, if we are wise, we will be guided. But having solved the horticultural problem of how to fertilize to produce the greatest quantity of marketable fruit the economic business problem in terms of dollars and cents remains —will it pay? This is more difficult than the horticultural one of how to grow fruit, but the all-important one for the grower. If the golden fruit does not leave golden dollars in the pockets of the grower, it spells failure.

During these war times, with the scarcity, and corresponding high price of fertilizer ingredients, the economic problem is doubly complex, and is made more so by the fact that no one can tell in advance what the prospective crop will bring in the markets, even if we are fortunate enough to escape the dangers of frost, drought, fungi and scale insects. The horticultural problem is not influenced by the war. If a tree in a certain soil, under certain conditions, required so many units of nitrogen, phosphoric acid and potash before the war, that same tree requires the same now during the war. In other words the economic problem is not directly connected with, and in a certain sense is independent of, the horticultural problem.

Let me illustrate: if 10 or 12% of potash was necessary horticulturally five years ago, it is also necessary now. If 2 or 3% of potash, or no potash, is sufficient horticulturally now, it would have been sufficient five years ago. In other words, the needs of the tree are absolute. If we fail to supply the tree with the elements necessary for its fullest development because of the scarcity or the prohibitive price of some of the ingredients, let us not deceive ourselves, but frankly admit that we are doing some violence to the tree because forced to do so

for economic reasons. Assuming that no permanent injury is done to the tree, the greatest net returns in proportion to expenditure, is the object sought. Citrus trees should be so nourished as to enable them, not only to properly mature the growing crop, but also to produce sufficient new wood for the next crop.

The first function of the citrus tree, like other living organisms, is to produce its kind so that the species may not perish from the earth, even if in so doing the tree sacrifices its vigor, or even its life. Feed the tree so that it may be able to mature its fruit properly, thus fulfilling the first functions of its nature, and also sufficiently that it may have a reserve energy to produce new wood, which is the hope of the next crop. Generally speaking, failure to understand the nature and requirements of the tree by using insufficient fertilizer, is the cause of only fair, or perhaps reasonably good crops each alternate year; with the proper treatment, there is no reason that a large percentage of trees in any grove should not produce every year, so that the production of the grove as a whole approaches a constant quantity; the variation being due largely to climatic conditions, some of which are beyond reasonable control.

The prime purpose of the grove is to make money for its owner. It is manifestly uneconomical and bad business to so treat a grove that only one crop every other year can be reasonably expected or hoped for. Why not get returns on your invested capital every year instead of every other year?

There are so many uncertainties in every line of business and especially in the citrus business, that if one is wise and hopes to obtain the greatest success, he should eliminate as far as practical every uncertain element. The intelligent observance of this principle will generally lead to success; its neglect, to almost certain failure.

The location of the grove may be excellent, drainage and irrigation all that could be desired, stock wisely selected, cultivation according to the best standards, but fail to properly fertilize, either as to time, quantity or quality, and the entire effort will be more or less of a failure, but a failure nevertheless. The general problem of fertilizers is the most complex and difficult of any that confronts the grower, especially during these war times. These observations and principles are generally accepted by the most successful growers. Let us follow them as far as practical. The crux of the matter is, how can these principles be applied to the best advantage by the average grower. The determination of how much nitrogen, phosphoric acid and potash to use on any particular grove for best horticultural results, can only be solved approximately. Few can afford, or think they can afford, to have the soil chemically analyzed, both qualitatively and quantitatively, to say nothing of a physical and bacteriological analysis. To add to our difficulties, the soil in few groves is of uniform quality, and therefore requires different treatment. I will say nothing about the physical and bacterial qualities of the soil, except that these should be taken into consideration

in the selection of the grove site. Porosity and bacterial content, both so important for the utilization of fertilizers, may be improved by increasing the humus content, by growing leguminous cover crops, and by correcting the acidity of the soil, if necessary, by adding limestone, or the growing of certain crops, such as watermelons or tomatoes.

Now, how much nitrogen, phosphoric acid and potash is required by the tree and fruit? Manifestly the irreducible minimum requirements, at least, are what the mature fruit contains. These quantities have been determined by many chemical analyses, and these quantities are fairly uniform in all samples of various citrus fruits. They are given by Hume (our President) in his excellent work entitled "Citrus Fruits and Their Culture," p. 302; viz.;

Nitrogen (N)	.149%
Phosphoric Acid (P_2O_5)	.055%
Potash (K_2O)	.249%

On a basis of 80 pound boxes, each 10 boxes represents approximately the following ingredients in pounds:

Nitrogen (N)	1.19
Phosphoric Acid (P_2O_5)	.44
Potash (K_2O)	1.99

Hume states that a fair approximation covering the fertilizer removed in the fruit, and that lost by leeching and required by new growth, will be two or three times the amount estimated for every ten boxes of fruit, which is equivalent to the following quantities in pounds as a maximum, viz.:

Nitrogen (N)	3.57
Phosphoric Acid (P_2O_5)	1.32
Potash (K_2O)	5.97

At present prices the raw material itself would cost about $3.70 per tree, on a basis of ten boxes of fruit, or $1.85 per tree of five boxes, of which about $1.05 represents potash, and $.80 phosphoric acid and nitrogen. By reducing the quantity of potash about one-half, we would have a cost of about $1.32 per tree. I think that an expenditure of from $1.00 to $2.00 per annum per five-box tree for fertilizer is economically justifiable. A less expenditure is false economy. Large, heavy bearing trees justify a correspondingly increased expenditure. In general, intelligent experience on the part of the individual, and especially his ability to profit by the experience of successful growers—a rare accomplishment—must be his best guide.

There are four methods of supplying fertilizer to the trees:

First.—By growing cover crops;

Second—By composting, as advised by State Chemist Rose in his last annual report;

Third.—By buying raw material and making the mixture required;

Fourth.—By buying mixed goods from the most reliable and responsible fertilizer companies, according to formula that best meets the requirements.

A combination of two or more methods is most economical, and is therefore the best practice. We can all grow cover

crops, thereby supplying nitrogen and humus. With increase of farm animals most growers could have a compost heap. State Chemist Rose recommends for compost:

"A cord of compost made of 3 parts muck of good quality (3% nitrogen), 1 part stable manure, (practically a ton), to which is added 200 lbs. of 16% acid phosphate, which will furnish sufficient fertility for an acre of ordinary soil; the manure will add the necessary bacteria, while the acid phosphate will form a medium for the growth of more bacteria and the conversion of the inert nitrogen to an available form."

Mr. Rose also adds:

"The neglect of the compost or manure heap in Florida has been an economic crime and has cost the growers of the State millions of dollars for commercial fertilizers, most of which could have been produced on the farm at a comparatively small cost in labor and care."

Perhaps a few words about the writer's own experience would be in order. He has no compost heap, but intends to have one. He does not mix his own fertilizer, though this too might save some money. He has always in his brief experience bought standard commercial fertilizers, mixed according to formula which appealed to him, from one of the reliable Florida companies, sometimes one, sometimes another, and so far with satisfactory results. This season he is using a standard fertilizer for fall application, analyzing 3% ammonia (NH_3), 6% phosphoric acid (P_2O_5) and 3% potash (K_2O). For January and May, he uses a 4-8-2 formula; before the war, 4-8-12. The potash content was reduced first to 5%, last year 3% and now to 2%.

A fall application is made about October first, of about 15 lbs. per tree; another application about January 15th, of about 25 lbs. per tree, and the third application about May 15th, of about 20 lbs. per tree. These applications are made for trees that produce from four to eight boxes per tree. The fertilizer is thoroughly incorporated with the soil, which the writer considers a very important detail. The grove is supplied with water from several artesian wells about 750 feet deep, and distributed over the surface through a system of underground pipes from 4 to 6 inches in diameter. The grove is irrigated whenever the writer considers that a good rain would be beneficial, but never within two or three weeks after fertilizing, the soil having been put in good condition before applying the fertilizer.

In conclusion I cannot neglect this opportunity to commend the general attitude and invaluable accomplishments of the Department of Agriculture of the State of Florida, from Commissioner McRae, its guiding genius, down to the heads and subordinates of its various divisions. I want to especially commend the work of the State Experiment Station and particularly in reference to the important subject of this paper, the ten years fertilizer test now being conducted for the benefit of the citrus growers of Florida.

I also commend the valuable work of the State Chemist Rose, and I hope the next legislature will enact workable laws which can be easily enforced, thus uphold-

ing his hands in the interest of Florida growers. He is in a position to save the growers and consumers of Florida more money than any other official of the State, if he be properly supported by our State Legislature.

My final advice is to fertilize, do it as economically as possible, but wisely and well; but fertilize.

Ft. Myers, Fla.

The Year's Developments in the Fertilizer Industry

W. J. Schubert.

While no upheaval has occurred in the fertilizer industry since our meeting at West Palm Beach last year, yet through gradual development changes of considerable importance have occurred.

Of primary importance are changes that have developed in available supply of certain vital materials. Of first importance in this respect we note a reversal in the positions occupied by ammonia and potash. Last year potash was a principal topic—today it is the least of our troubles. Last year, while the ammoniate supply situation was reviewed at some length, it occasioned no great concern—today much serious thought is being devoted to it. The situation as regards supply of phosphatic materials shows least change.

But concern over supply of materials is not all; shortage of labor, fuel, transportation, bagging, increased cost of operation, all demand attention. Governmental recognition of the fertilizer industry's vital importance to the nation is another noteworthy milestone passed during the year.

Let us go into detail. First we will consider the at present all-important topic of ammoniates.

AMMONIA.

In the first place, what part does ammonia play in plant life that warrants its use? The answer has been conveniently summarized by Dr. Lucius L. Van Slyke in his book, "Fertilizers and Crops."

"The nitrogen-containing compounds in plants are of peculiar importance in relation to the life and growth of plants, since they form an essential part of an important substance known as protoplasm which is the living part of plant cells. On account of this relation, no other substance can so quickly show its beneficial effect upon plant growth as nitrogen, when properly applied.

"The agricultural importance of nitrogen is indicated by the following facts: (1) This element is an essential constituent of plant foods; (2) the amounts of nitrogen ordinarily available in nature for immediate use are very small; (3) nitrogen is one of the elements of the soil that is most heavily used by crops; (4) of all forms of plant foods in commerce, nitrogen is and always has been the most expensive; (5) nitrogen is the most elusive of plant food constituents, since it changes sooner or later into some form that is easily lost to soil and plants."

Nitrate of soda, sulphate of ammonia, blood and bone tankage and cottonseed meal have been the "big four" in our supply of ammonia.

Nitrate, as we all know, comes from

the western coast of South America, this being the only known deposit. There is no trouble with the production of nitrate of soda in Chili; in fact, more could be produced there. But shortage of vessels in which to bring it to the United States, together with the requirements of munitions-makers, has led to gradual reduction in importations during the past two years, and recently to a rather acute shortage in the supply available to the fertilizer industry. One and one-quarter million tons were imported in 1916; we fell just short of a million tons in 1917, and imports for 1918 are estimated at 860,000 tons. Thus supply has fallen while demand has increased.

Sulphate of ammonia is a by-product of coke. Coke is simply partly burned coal; it bears the relation to coal that charcoal does to wood. Coal averages about 1% nitrogen. As coke is made this nitrogen escapes in the fumes, but in certain types of ovens the fumes are "scrubbed" with sulphuric acid, and about one-sixth of the escaping nitrogen is caught in the shape of sulphate of ammonia. Of all coal burned in this country during 1916, it is estimated that only 3% was burned under conditions permitting recovery of nitrogen. Increasing production, however, indicates that installation of modern processes is proceeding. In 1914 we used 272,000 tons of sulphate of ammonia. Two-thirds of this we produced and one-third we imported, principally from England and Germany. In 1916, the last year for which statistics are at hand, we used 347,000 tons, of which we produced more than nine-tenths. In other words, American production increased from 166,000 tons in 1914 to 325,000 tons in 1916; an increase of practically 100%. But sulphate of ammonia is highly valued by the munitions-maker, and it also plays a part in artificial refrigeration. As a result, though American production has probably far more than doubled during the war, this material is now under rigid governmental control, and it is understood that the fertilizer manufacturer is to receive but a small fraction of even the restricted supply he was able to obtain last season.

Statistics given in Circular No. 104, compiled by the Bureau of Markets, U. S. Department of Agriculture, show that blood and bone tankage was produced in approximately one-third less amounts in 1917 than in 1916; and the outlook for 1918 is that last year's production of 356,542 tons will only be equalled or slightly exceeded. But even this tankage is not left entirely to the fertilizer industry, for we must compete with the live-stock men, who value "feeding tankage" highly, and can afford prices that look very high from the fertilizer standpoint. Just how much of the 1918 production of tankage the feeding trade will get cannot be accurately estimated.

The above-mentioned circular shows 1917 production of cottonseed meal and cake to have been approximately one and one-half million tons, and that producers estimate capacity for 1918 at somewhat more than two millions of tons, or a one-third increase. These figures probably referred to the meal resulting from the

crush of the 1917 crop, which was just commencing when the circular was issued. If such is the case, then the one-third increase has availed but little, since cottonseed meal is already scarce, while the next crush is still a half-year distant. And here again, the fertilizer man in search of his supplies meets competition from the livestock man.

To sum up, a marked decrease in supply of ammoniates is indicated for 1918, while demand promises to be not far behind the pre-war figure of 1914. The trouble is that guns and crops both need ammoniates, but the guns have first call. Nitrate of soda and sulphate of ammonia are directly under governmental control, and the fertilizer industry must take what is left after the munitions-maker has been supplied. Cottonseed meal and tankage are indirectly under government control through licensing of feeding stuffs sale by the Food Administrator. Let it be added that the government is fully alive to the needs of the fertilizer industry, and is making every effort to do the best possible under present circumstances.

In buying fertilizers for our 1918 crops, then, let us study carefully our ammonia needs to the end that none of this much-needed compound is wasted. Few of us are awake to the possibilities of the legume—velvet beans, cowpeas, beggarweed, etc.—as a nitrogen gatherer. Let us also make full use of this source of supply.

PHOSPHORIC ACID.

Next let us examine the phosphoric acid supply.

Five-sixths of all phosphoric acid used in commercial fertilizers in this country comes from acid phosphate. Last year's production is placed at just over three million tons, while manufacturing capacity for 1918 is estimated to be one-third greater. Most of the remaining sixth of our supply comes from bones and tankage; 1917 production of bones having been slightly over 100,000 tons, with 1918 capacity estimated one-fourth greater. Other sources—basic slag, fish, guano, imported acid phosphate, apatite, etc.—make up but an insignificant fraction of our total supply.

Since, then, our phosphoric acid supply depends mainly on acid phosphate, what is the outlook for this material for 1918?

Acid phosphate is made from approximately equal parts of ground raw rock phosphate and sulphuric acid. As manufacturing capacity for acid phosphate seems ample to supply our 1918 requirements, our concern is that our plants be kept running to full capacity. This involves maintenance of sufficient supplies of rock phosphate and sulphuric acid.

As sulphuric acid has become an important article of industry, widely used in many other lines as well, let us pause a moment to consider it. Briefly the principle of production is the spraying of sulphur fumes with water, in the presence of a small percentage of nitre fumes. This brings about a chemical combination between water and sulphur, resulting in sulphuric acid. Sulphur fumes are obtained by burning pyrite (an ore containing sulphur), though lately pure crude sulphur has been burned to some extent. Nitre

fumes are obtained by "potting" nitrate of soda with sulphuric acid.

Capacity for manufacturing sulphuric acid has increased greatly since the outbreak of war, total 1916 production being nearly five and three-quarter million tons, of which probably four millions were produced or used outside the fertilizer industry. This product, also, is a vital necessity to the munitions-maker, and the fertilizer industry has, in the past, been called upon to assist him to some extent.

The raw materials, then, necessary to the manufacture of acid phosphate, are phosphate rock, pyrite, or sulphur, and nitrate of soda. Fuel, labor and transportation are also factors.

The supply of raw rock phosphate depends upon labor to mine it and cars in which to transport it to manufacturing plants. The situation as regards labor and transportation is rather too familiar to all of us. Suffice it to say that much difficulty has already been experienced, especially by manufacturers at some distance from the Florida, South Carolina and Tennessee deposits, and that only through active governmental co-operation in exempting phosphate rock from transportation embargoes has prevented possible shutdowns by some plants, while others are at times not able to run at full capacity.

Spanish pyrite heretofore has supplied three-fourths of the sulphur employed in our sulphuric acid plants, domestic production making up the remaining fourth. Recently shortage of vessels occasioned a rather acute situation through reduction of imports. This has been met in part by increasing domestic production and by using crude sulphur. But American deposits of pyrite in the Eastern States are rather small and scattered, and the ore of lower sulphur content than the Spanish. Development of new mineral deposits requires time even under stress, while the fact that these new ventures must compete with Spanish pyrite at the close of the war has tended to retard somewhat their commercial development. Two deposits of very pure sulphur are found in the Gulf States, which, of necessity, have been drawn upon to some extent by the sulphuric acid industry; but greater cost, necessity for slight change in manufacturing technique to burn sulphur, uncertainty as to duration of war, and probable necessity of returning to use of pyrites upon arrival of peace, difficulties in transportation, etc., have tended to bar its general use. All in all, supply of sulphur promises to be a limiting factor in the production of acid phosphate during 1918, though to what extent it is impossible now to foretell.

Nitrate supply has already been touched upon. Fuel, transportation and labor will be mentioned in a moment.

To sum up, let us be reasonably optimistic over the phosphoric acid situation. It cannot be denied that production is struggling against difficulties of considerable magnitude, but, barring the unforeseen, there should be at least a moderate supply for us all.

POTASH.

Present American production of potash is very far below pre-war imports, but de-

mand has also fallen to such an extent that it seems probable that American production has reached sufficient volume to care for present restricted demand.

Several sources are being developed or are furnishing a fraction of our total, but there are three principal American sources of potash. The great bulk of our production is recovered from the lakes of Nebraska. The material thus produced carries 22% potash, in which several chemical combinations are noted. Searles Lake, California, is also yielding a product in which is contained 44% potash, mostly in the form of carbonate. From the alunite of Utah is being produced in considerable quantities an extremely pure sulphate of potash, which in the average exceeds in quality the best grade of German sulphate heretofore imported.

Pacific kelps, ashes, tobacco stems, cement by-products, etc., make up the total.

Incompatible chemical combinations have been encountered in the attempt to combine one or two of the American potashes in mixed fertilizers, but their characteristics are now pretty well understood, and the Florida grower may purchase fertilizers containing American potash with the assurance that his crops will get full benefit therefrom.

Generally speaking, citrus growers have used but little potash during the past three seasons. Potash now costs less than ammonia, and the fact that American potash can now be obtained would indicate the advisability of giving this plant food careful consideration in planning the ration of the grove.

OTHER FACTORS.

Under this heading we may properly consider the burlap situation, transportation and manufacturing conditions.

Burlap: Our burlap comes principally from India, and has been seriously affected by shortage of shipping. It is also needed for use in trench work on the battlefronts of Europe, and our government has requested that it be conserved to the greatest possible extent. Hence the use of second-hand bags by manufacturers during the past season, and the request that the use of 100-lb. sacks be discontinued, since it requires an additional 4½ yards of burlap to put up a ton in 100-lb. sacks.

Let us aid our army by ordering 200-lb. sacks only, by caring for them upon arrival, and should they be sufficiently strong to withstand refilling, by notifying the manufacturer's salesman, who, after inspection, may be glad to buy them back.

Transportation: Seventy-five per cent of all freight handled by the railroads at present is for the government. Thus, in a sentence, we have explanation of present transportation troubles.

Governmental control of railroads has undoubtedly resulted in increased efficiency, but your co-operation is urgently needed here, too. The government has repeatedly requested the fertilizer industry load cars to 10% above marked capacity; the 30-ton car should be loaded to 33 tons; the 40-ton car to 44 tons; the 50-ton car to 55 tons. Club together, then, and make up these amounts in ordering. And place orders well ahead so as not to have to worry railroads with tracers until delay

has become entirely unreasonable. Perhaps you cannot always do this; perhaps your bit may seem small, but it will help.

An ugly rumor has lately been whispered about that railroad officials are attempting to discredit governmental control. It is, perhaps, a German propaganda. Forget it. A situation once congested is doubly difficult to relieve, and the government is undoubtedly doing its best.

Manufacturing Conditions: Let me here bespeak consideration for the fertilizer manufacturer; he, too, has his troubles. Fuel supply is precarious; labor costly, hard to obtain and hold; though much of his business is done on long credit, he must pay cash himself for materials often slow in arriving and of uncertain delivery; some of his most efficient help has been drafted; his cost of operation is constantly increasing.

However, war has brought home the importance of the fertilizer industry. By presidential proclamation it is under government supervision. It has been rated as a "preferred industry" and thus exempted from freight embargoes. It has surmounted serious difficulties and will continue to do so.

THE LOW ANALYSIS EVIL.

War has served to accentuate a costly evil already too prevalent in times of peace—the fallacy of buying a low analysis under the impression that money is thus being saved.

For example, two growers, Mr. A and Mr. B, need fertilizer. Two brands are offered to each. Brand No. 1, analyzing 3% of ammonia, 6% available phosphoric acid and 2% potash, costs $50 per ton, f. o. b. Jacksonville. Brand No. 2 analyzes 4½% ammonia, 9% available phosphoric acid and 3% potash, or just one-half again as much actual plant food as No. 1, but it costs $68 per ton. Freight rate is, say, $2. Mr. A buys three tons of Brand No. 1 at $50, thinking that he is saving money because the cost per ton is less. But Mr. B has a mathematical turn of mind, and after doing some figuring, buys Brand No. 2 at $68. Let us see which made the best deal.

Mr. A paid $150 for his three tons at $50, plus $6 freight, making total delivered cost $156. Mr. B paid $136 for his two tons at $68, plus $4 freight, making his total delivered cost $140. Thus Mr. B has obtained exactly the same quantity of plant food at $16 less than Mr. A. This $16 represents additional cost of plant food in lower grade materials, and cost of manufacturing, bagging, selling, freight, etc., on one extra ton.

Think of it! A possible saving of $16 on three tons of fertilizer! The fertilizer manufacturer much prefers to make high analyses, but he must furnish what his trade demands. Yet we even find growers purchasing such low analysis as 2-8-0. —only ten per cent plant food per ton.

True economy lies in the high analysis fertilizer, and now, as never before, true economy counts.

SUMMARY.

To sum up, the following conclusions, drawn from consideration of the foregoing conditions, are offered:

1. A reduction in available supply of ammonia is indicated; study your requirements carefully; buy what you can use with profit; avoid waste; use legumes.

2. Available phosphoric acid at present is a most profitable investment. A reasonably large percentage should be included in your fertilizer.

3. Potash is cheaper than ammonia, and supply promises to be sufficient under present demand. Since little has recently been used, at least a small percentage is advisable.

4. Co-operate with your government and the railroads by ordering early, and making up carlots of 33, 44 or 55 tons.

5. Help the boys "over there" by conserving burlap by ordering everything in 200-lb. sacks, and caring for and returning them.

6. Remember that it is true economy to buy high analysis goods.

Jacksonville, Fla.

Avocado Varieties for Florida

Leo B. Scott.

Since the fall of 1915 one part of the subtropical production project of the office of Horticultural and Pomological Investigations of the United States Department of Agriculture has dealt with the study of the comparative merits of avocado varieties, both in Florida and California. Reports from time to time on the progress of these investigations have appeared in the annual reports of the California Avocado Association, and have been reprinted in The Florida Grower.

The freeze of February, 1917, in Florida, the cold weather experienced this last winter, and the excessive heat in June, 1917, in California, have all had their effect in retarding new plantings of avocados. However, there is in both States a decided interest in avocado growing, and considerable information has already been secured concerning the frost and heat resisting qualities of the different varieties.

The avocado has often been described as the perfect salad fruit. Prior to the world conflict in which we are now engaged the search for fruits or vegetables which might be utilized in salads was of considerable importance. At the present time, however, the whole country is more interested in securing essential foods. The avocado fills a dual role in this respect, in that, although it is a salad fruit, it also is a meat substitute. Many of the varieties, particularly those which are found in the Guatemalan race, have a very high oil content. In some varieties this oil content runs as high as twenty-five to thirty per cent. It can readily be seen that a fruit as rich as this has distinct possibilities as a meat substitute.

In any discussion of the avocado, it must be clearly borne in mind that while the commercial industry, both in Florida and California at the present time only represents a limited acreage, nevertheless a great number of varieties have been introduced into the United States. At the October, 1916, meeting of the California Avocado Association, held in San Diego, California, Professor I. J. Condit, of the University of California, presented a list of 146 named varieties of this fruit. Some of these varieties belong to the Mexican race, others to the West Indian, but probably the greater number were of the Guatemalan.

The West Indian race is the one which you are most familiar with in Florida. It includes the Florida seedling avocados, the seedling trees found in the West Indies, and some of your standard budded varieties, such as Trapp, Pollock and Walden. Characteristics of this race in

brief are a fruit with a leathery, pliable skin, and a tree of almost tropical tendency, in that the foliage is injured at temperatures lower than 30° F.

The Mexican race, on the other hand, is quite hardy, and often will withstand temperatures as low as 25° F., and even lower, without serious injury. Most of the fruits of the Mexican varieties are small, thin-skinned, and many of them contain a considerable amount of fibre. The fruits have a very high oil content, and the leaves have a distinct anise odor. Although the fruits of most of the Mexican varieties are small, a few have been introduced which bear quite large fruits. A seedling Mexican tree growing in the Plant Introduction Garden at Miami bears a fruit which weighs considerably over a pound.

The Guatemalan race bears a fruit which has a very thick skin and distinct hard shell. The fruits as a rule show no fibre, or only a slight trace, have a very high oil content, and possess a rich, nutty flavor. Guatemalan varieties are not as hardy as those of the Mexican race, but some of them can stand temperatures of 27° or 26° F. without serious injury.

The ideal avocado, as described by hotel men and those engaged in the fancy fruit trade, is one which weighs a pound or a pound and a half, has a small seed, is free from fibre, rich in oil, and a fruit which can be served in the half shell. Although there have been a great number of varieties introduced in this country, very few of them bear fruits which meet all the requirements of the ideal avocado.

During the season of 1916 and 1917, in co-operation with the California Avocado Association, we conducted investigations in all the avocado orchards in that State. Performance records were secured of practically all the bearing trees in California. In addition to the actual records on the amount and quality of the fruit produced by the individual trees, analyses were made by Mr. E. M. Chace, Bureau of Chemistry, United States Department of Agriculture, of many of the varieties. Notes were made of the frost resistance and heat resistance of the different kinds. Partially as a result of these investigations, and other independent investigations by the growers and investigators of the University of California, a special committee on classification and registration of varieties, of the California Avocado Association, on Oct. 25, 1917, issued Circular No. 1 of that Association, in which they recommended eight varieties for planting in that State. These varieties are Fuerte, Spinks, Blakeman, Lyon, Dickinson, Taft, Sharpless and Puebla, which, in the opinion of the committee, were those which seemed the most promising for California conditions. Some of these, in addition, look very promising for Florida.

The Fuerte is a pyriform fruit, green colored, weighing 12 to 14 ounces, the seed weighing 1½ ounces. The highest oil content given for the Fuerte is 30.72 per cent. Its season in California is from January to August. Budded trees in that State come into bearing the second year. A performance record of all the three-year-old budded Fuerte trees in the orchard of Mr. J. T. Whedon, Yorba Linda,

California, showed a range in production of from 1 to 86 fruits. In June of the same year those trees were subjected to temperatures ranging as high as 110° to 112° F. This heat wave lasted four days. This year the trees, although not bearing quite as large a crop as in 1917, are producing quite a number of fruits.

While it would not be safe to assume that the varieties recommended for California could all be introduced into Florida and prove equally good here, the action of the California people, however, does give the Florida growers a little definite information to use as a starting point.

I will review briefly the general characteristics of the other California varieties, as they may be of some interest to the Florida growers.

The Spinks is another spring and summer fruit. The original budded trees of this variety are owned by Mr. W. A. Spinks, of Duate, California. The original seedling tree probably is growing a short distance from Mr. Spinks' place. Budded trees, however, fruited several years before the seedling. Mr. Spinks had secured buds from many seedling trees in California prior to the freeze in January, 1913. The two budded trees of this variety, which at that time were not named, in his opinion withstood the cold as well, or better, than any other varieties in his nursery. As a result, he propagated from this variety before it fruited. When it came into fruit he was so greatly impressed with the merits of this avocado that he used the name Spinks in referring to it. The fruits weigh considerably over a pound, are obovate or pyriform in shape, with a purplish black color. The average weight is 16 to 20 ounces. The seeds weigh about 3¼ ounces. The percentage of oil in the Spinks is 15% or 16%.

Another summer variety is the Blakeman. The original tree of this variety is a seedling owned by Mr. Edward W. Dickey, El Cerrite Drive, Hollywood, California. The fruit is pyriform in shape, green colored, season April to August, average weight 16 ounces, average weight of seed 2½ ounces, percentage of oil 17.

One possible objection to the Blakeman is that it belongs to the Murietta strain of trees; that is, it is one of the seedling varieties introduced by a Mr. Murietta, of Los Angeles, California, a number of years ago. All the other varieties of this introduction appear to be very weak growers. The Blakeman in a few instances has shown this same tendency.

Another spring and summer variety recommended for California is the Lyon. The Lyon is a peculiar variety, in that it has a very upright habit of growth and does not show any inclination to spread. For this reason it is especially recommended in that State for use as a filler, being planted between other standard varieties. As the trees come into fruiting very early, the Lyon can be left in the orchard for six or seven years, and then be removed when the other trees begin to crowd them. The fruit is pyriform, of dark green color, about the same size as the Spinks or Blakeman. It weighs about a pound, the seed weighing two to three

ounces. The oil content is about 16%.

The Dickinson and Taft are summer and fall varieties. Their season approximately is from June to October. The Dickinson is a small fruit, only weighing 12 ounces. They are obovate in shape, purplish black in color, the seed weighing a little over an ounce. The percentage of oil is quite high, analyzing about 20%.

The Taft is a native California seedling, originating at the place of C. P. Taft, Orange, California. It bears a fruit which is green in color and obovate to pyriform in shape. The fruits weigh about one pound and the seed about three ounces. The percentage of oil runs from 15% to 17%.

One of the most interesting varieties in California is the Sharpless. Its season is usually given from October to February. The original tree is owned by B. H. Sharpless, Santa Anna, California, and first fruited in 1912, bearing two fruits that year, twenty in 1913, seventy-five in 1914, 250 in 1915 and over 600 in 1916 and 1917. The fruits average 20 to 22 ounces in weight, are pear-shaped, and when matured are a beautiful dark purplish maroon color. The seed weighs about three ounces and the oil content averages 24%.

The last one of the eight varieties recommended, the Puebla, is a winter variety. The only objection to the Puebla is the small size of the fruit, as they only weigh 8 to 10 ounces. It has a distinct place, however, in home plantings, as it is the hardiest of the eight varieties. In addition, the fruit has a very high oil content, running to 25% or 26%. As it is comparatively free from fibre, it is a very desirable fruit in home planting.

In co-operation with interested avocado growers in several parts of Florida, budwood of some of these standard California varieties, as well as others which were rejected as not suited to California conditions, have been introduced in this State. These varieties have been placed on the three stocks, Guatemalan, West Indian and Mexican, in an attempt to find out if they were suited to Florida conditions, and also which stock was the best suited to the different sections of the State. In California the only stock used for avocado varieties is the hardy Mexican. Up to date in Florida the only stock used to any extent has been the very tender West Indian. By means of these experiments it is hoped to find out whether the thick-skinned varieties will do as well on West Indian stock as on Guatemalan, or the hardy Mexican. The question of most interest to avocado growers, or to prospective growers, in Florida, is what varieties ought to be planted in this State. Any recommendations concerning varieties made by me today must be looked upon really as suggestions, and may be subject to change even within a year.

In sections where cold injury is only experienced at infrequent intervals, the standard avocado variety, and the one which has made the reputation of the Florida avocado industry, is the Trapp. This is a fall fruit, and although lacking in some of the characteristics which would rank it an ideal avocado, it nevertheless has become established on the fruit markets, and is known to the trade.

The season of the Trapp is late fall. It has the decided objection of having a large seed, and quite a low oil content. For these reasons it is probable that other varieties eventually will be found which will supplant the Trapp as a fall fruit.

Another very promising variety of the West Indian race is the Walden. Its season is somewhat later than the Trapp; fruits can be left on the trees as late as Christmas, or possibly a little longer.

During the past winter considerable information has been secured in a number of sections of Florida on the frost-resisting powers of the different varieties.

Of the Guatemalan thick-skinned varieties, the Fuerte, Taylor, Perfecto and Taft probably look the most promising at the present time for your conditions. The Fuerte withstood temperatures of 26° F. this last winter in Homestead sections without serious injury to the foliage, and in addition held most of the fruit. The Taylor seemed even more resistant than the Fuerte. The Perfecto and Taft ranged next in order of hardiness. The Taft, from all reports, seems even hardier in Florida than in California. The Taylor is a Florida seedling. The seed came from California. About 1908 Mr. J. W. Walker, of 1547 Los Palmas avenue, Los Angeles, California, had two seedling avocado trees in his yard which bore fruit for the first time that year. These trees afterwards came to be known as the Challenge and Royal. He sent fruits from these trees into the Department of Agriculture to Dr. Taylor, now chief of the Bureau of Plant Industry, who was then in charge of field investigations in pomology. After making descriptions of the fruits, Dr. Taylor gave the seeds to the office of Foreign Seed and Plant Introduction. They were sent to the plant introduction garden at Miami, but no record was kept of the fruit from which each seed came. One of the trees grew, and when it fruited it was named "Taylor," as the seed had been secured from Dr. Taylor in Washington. The fruit is pyriform, and in this respect it resembles the Royal. It is green colored, however, and in this respect is similar to the Challenge. It does not possess as much fibre as either one of those varieties. From limited observations which have been made of the behavior of this variety in Florida, it would appear to be superior to either the Challenge or Royal of California. The fruit weighs considerably over a pound, has a relatively small seed, and has an oil content which apparently is comparable with the Spinks.

A number of varieties have been introduced in Florida which have been discarded in California. Many of these varieties are showing the same undesirable characteristics here in this State. It would, therefore, seem that the growers should hesitate in planting them.

As previously mentioned, all the Mexican varieties are too small to be given any consideration as commercial possibilities, with the possible exception of the one growing at the Plant Introduction Garden at Miami. However, the fruits of that variety have the serious drawback of producing seeds which are loose in the cavity.

Of the other thick-skinned varieties,

trees of the Colorado, Dickey, Presidente, Murietta Green and Royal, make a very sickly growth, and if they are left to grow, produce one or two crops, then die. Although only a few of these varieties have fruited in Forida, young trees which fruited in Florida, young trees which have been introduced in most cases seem to show these same characteristics. It would, therefore, seem that the grower is taking a big chance if he includes any of these varieties in his planting.

The Solano has a very low oil content, and the trees are quite tender. This variety has shown these characteristics in Florida this last winter.

The Grande in Florida has developed, as in California, the same black decay in the fruit and shows considerable fibre. The Wagner and Walker are small fruits, and as they mature in California during the summer months, they are in competition with larger and better varieties. Regardless of what their season might be in Florida, there would be this same competition with larger fruits, so we do not believe these varieties should be considered. The Lambert and Barclay avocados in California have a tendency to split. These varieties have not yet fruited in Florida, but if this trait is repeated here, it will throw them out of consideration. Miller, Meserve and Ferry in California are all shy bearers. I do not know whether the Miller and Ferry have been introduced in this State, but the Meserve appeared to be very tender this past winter. The Knight varieties in the Homestead section appeared to be more tender than the same kinds when grown in California. This may possibly have been due to the fact that some of the trees were not in a very vigorous growing condition, as at Lucerne Park. There some varieties came through in good shape.

While it must not be assumed that new varieties will not be introduced which will prove superior to existing ones, still the man who intends to invest considerable capital in an avocado planting cannot afford to experiment with new and untried sorts.

Mr. Wilson Popence, of the office of Foreign Seed and Plant Introduction, has just brought back from Guatemala a number of varieties of Guatemalan or thick-skinned avocados. These will be tried out experimentally in Florida and California. However, it will be several years before any definite information concerning these varieties can be secured, and it certainly would not be safe to plant them in commercial orchards until they had fruited for at least two years, and they had been found to be far superior to existing standard kinds.

In order to protect the development of the avocado industry, and not to duplicate the experience of the California people, where it was necessary for them to weed out many varieties which never should have been introduced in commercial orchards, there should be some central agency of the avocado growers in this State which should have the final voice in the question of varieties. In California the growers have an avocado association, and in this association there is a special registration committee, which, in co-operation with the government and State offi-

cials, pass on the respective merits of the varieties. In this State you have no avocado association. You have, however, in your Horticultural Society a standing committee on avocados. Why, then, cannot this committee act as a registration board and advise the growers concerning the proper varieties to plant? At the present time the varieties which are the most promising are the Trapp for a fall fruit in the warmer sections, and the Fuerte, Taylor and probably Taft for sections where the temperatures may fall to 28° F.

Bureau of Plant Industry, Washington, D. C.

Avocados

Lloyd S. Tenny.

So far, the Horticultural meeting has been devoting most of its energy and time to questions pertaining closely to war. As the speaker last night brought out, however, there are many phases of this war problem. One of the most serious is the problem of food. Most of our fruits, when they come to be analyzed, do not show a high percentage of what are generally termed food qualities. I do not mean to say or imply that the qualities which they do possess are not essential in our diet or that they do not play a very important part. We all know they do.

The avocado, however, stands in a class by itself. In fact, there is only one other fruit grown anywhere in the world that can compare with the avocado in food value; that is the olive which remains on the tree until it is a ripe olive.

Conditions being as they are today, it is unfortunate the State of Florida did not realize its opportunity years ago and plant avocados extensively. We might easily today be shipping throughout the east, the north and the west, a food product that is unsurpassed; a food product that will average from 18% to 30% pure oil; an oil very easily digested; an oil that is an excellent food; an oil that is probably the very best substitute known for animal oil.

But we are too late for this war. Florida cannot produce enough of this fruit at this time to help much in these critical moments. None of us knows what is in store for this country, but one thing is clear, and that is from this time on, animal fats will be comparatively scarce. We, as American people, are going to know and appreciate vegetable oils more than we have ever done before and I predict that from this time on, vegetable oils are going to play a far greater role in our diet than we ever dreamed of.

And I also predict that among these vegetable oils, that from avocado, not separated but in the fruit itself, will be one of the most important of them.

The first question, therefore, that comes to my mind, is this; will the avocado ever become an important product in Florida? Probably the first question in connection with this is, can the avocado be grown successfully in Florida? Are climatic conditions favorable; the rainy seasons, the cold and hot periods, such as to bring about the best results in the production of this wonderful fruit?

I believe I am safe in saying that while there are difficulties yet to be overcome, the avocado can be grown successfully in quite a considerable portion of the State of Florida.

This question of avocado varieties, of

the possibilities of avocado production, is rather a complicated one, for the fact that for years we have grown in Florida, in the southern portion, a number of avocados. These, as you doubtless know, were practically all introduced from the keys of West Indies; localities where there was no cold weather such as we have. When those varieties, tropical in their nature you might say, were brought into Florida and were tested out under conditions where they had to stand a little cold weather and a little frost, and farther up the state where they had to encounter freezing temperature, we ran across a good many obstacles.

There are only a few points in South Florida where the West Indian varieties of avocado have been grown with anything like success. That fact alone has caused a strong prejudice among a great many growers, and many of them are convinced that this state is altogether too cold to grow them successfully and that it is a waste of time to attempt it.

About five years ago, the avocado began to be looked upon as a possible profitable horticultural crop for the state. Considerable acreage was planted in Dade County and the groves there have begun to come into bearing to considerable extent. The freezes of the past two years have in a way put us back in our avocado business and a good many of us who have been interested in the avocado are beginning to ask whether after all, the West Indian varieties will be suited to our Florida conditions.

I am frank to say that I believe there are a good many acres of Florida land that if planted to West Indian varieties such as the Trapp or Walden, would give magnificent financial returns.

But there are a number of nurserymen especially in California who are bringing into the United States, types of avocados that are more hardy than the West Indian. So we find now the Guatemalan and the Mexican type. The Mexican type is the most hardy; it can be grown practically wherever citrus is grown in Florida. There are trees in Orlando and nearby towns; there is a large tree eleven or twelve miles north of Gainesville where the citrus trees have been killed back year after year and yet the avocado tree has grown and produced fruit practically every year for the last twelve or thirteen years.

But unfortunately, most of the Mexican varieties are small fruited. Unfortunately, also, the majority ripen during the summer months, and a great many of them are of comparatively poor quality, soft fruit, so that they are not good shipping varieties.

Consequently, at the present time, the tendency is away from the Mexican varieties. As horticulturists, you must appreciate the fact that a variety that has not good carrying qualities, a variety that does not mature fruit at the proper time, and varieties that have inherent weaknesses, are not good commercial propositions, so we are gradually drifting away from the Mexican varieties.

But the same is not true of the Guatemalan varieties. They are varieties that were introduced from the highlands of Mexico and Guatemala. There they have frosts and sometimes snow. Consequently the avocados have a good deal of

the hardiness of the Mexican and they have the additional advantages of being of fine size, splendid appearance, excellent quality and mature at just the time when salads are highest in price, just at the time when we want them to go to the northern markets, from January until April or May. So it seems in the Guatemalan varieties we have found the avocado for general planting in Florida.

The editor of the Florida Grower suggested that the Guatemalan variety be named the Krome. That is somewhat amusing when you consider that there are at least a hundred Guatemalan varieties being tested out in this country.

The Guatemalan variety represents a hard shelled fruit, a variety that analyzes very high in oil content, and ripens in the winter time; a variety that is comparatively hardy, but just how hardy we cannot say. When the Government gets through with its work and you growers get through with your experiments, we can then tell how they are going to do in the different parts of the State. I think we can safely say the avocado has a place in Florida. I would prophesy that in the course of the next ten or fifteen years we will see plantings over perhaps Polk County, across to the eastern coast down to the southern end of the State of Florida; and both on the east and on the west thousands of acres of avocados. I cannot see any reason, when the trade in the northern markets are willing to pay $20.00 to $30.00 per crate for avocados as they will do now if you will supply them at the time when the market is comparatively bare, say in December, why it should not be one of the most profitable crops. Shipments are going out from Dade county with a net return of $20.00 or $30.00 a crate.

When the people are willing to pay those prices, it seems to me it is easy to get them to use all we can ship, even from a largely increased acreage. The public can be educated to eat it either as a breakfast fruit, as a salad or as a dinner dessert. It is possible to eat it at any meal in the day, and at a reasonable price when we consider the food value an avocado has, pound for pound, when compared with other foods; lean meat, for instance.

The thought I want to leave with you is this; the avocado is a coming fruit in Florida. Just as soon as we know more about the Guatemalan varieties, we want to plant them. We want to plant them and watch their progress critically, but with an open mind, testing them out carefully. And you people who represent the horticultural interests of Florida, you are going to be the people we must depend upon to give us the field testing we need to develop this fruit. We will be ready in the next two years at least to make some pretty definite recommendations with regard to varieties we believe to be worthy of being tested out in more than an experimental way here in Florida.

Miami, Fla.

DISCUSSION.

Mr. Gillett: It seems to me a very important matter to know what root to bud these hardy varieties on. Is it determined yet whether the West Indian root, which we know to be a vigorous grower, is as safe to bud upon as the

Guatemalan or the Mexican roots? I understand the Mexican root has not done well in Florida. Would it be wise to bud the hardy varieties on the West Indian root, which is rather tender? If the trees are budded low and then banked in the fall, would it not be as safe to bud on the West Indian as on the hardy root?

Mr. Scott: I cannot answer that question. We have no comparative experiments. We are trying to find out that very point. Of course, the only stock of which you have any quantity at present is the West Indian root. The Guatemalan varieties make a fine growth on the West Indian root. The only thing to do is to try it out.

The Mexican stock is very slow as compared with the West Indian. In California they have the same difficulty.

Mr. Gillett: Do they bud most of the trees on the Mexican stocks, in California?

Mr. Scott: Entirely so. The buds on Mexican stocks seem to be hardier than those on Guatemalan. It was clearly shown in 1915 that Guatemalan varieties on the West Indian Stock were not as hardy as those on Mexican stock. But they never bank in California and the stock was unprotected.

Mr. Gillett: It seems to me if the stock were well banked, it would be an advantage to bud on the West Indian, because it is such a rank grower.

Mr. Scott: It is a decided advantage, because the Mexican is such a slow grower. But I am not in position to offer any definite information until the trees come into fruiting in the different sections where we are trying them out. We hope to have definite information in two years.

Mr. Tenny: I do not believe it has been brought out quite clearly that the United States Department of Agriculture is undertaking to test out this question of stocks. Perhaps Mr. Scott does not want it told. But there are going to be in the state three or four test plantings where these more or less promising varieties are going to be tried on the different stocks; and just as fast as we can, we are hoping to make progress on these problems that confront the avocado grower. I have been in the government garden at Miami a great many times. There they have various stocks, old trees of the Mexican, Guatemalan and West Indian types, and while they have not performed any set experiments, they have a good many different varieties budded on one stock, and in other places on another stock.

I am free to confess that it takes a good deal of imagination to see, under ordinary conditions, any marked difference in the same variety on different stocks.

We are unable to test out the question of hardiness there because all of our Guatemalan varieties on the different stocks have been untouched by any of the cold weather we have had.

Sometimes we have thought there was a difference in the bloom period; in other words, the stock makes the tree a little more dormant in the winter time. In some other cases we are trying to believe that the Mexican stock may be suited to more moist conditions, and it may be possible that the Mexican stock may be better suited for that kind of planting.

Mr. Scott: We have been slow in

getting these tests started. They were originally planned in the fall of 1916; and when Mr. Vosburg was stationed in the state, a part of his duties were to carry out these experiments. We had made all arrangements to secure the buds from California when the freeze of 1916-17 came.

We have been practically a year getting the bud wood through into Florida; it has taken a good long time to convince your Plant Board that we were not bringing any pests into Florida. You have a good man on that Plant Board looking after your interests. Every tree in California from which that bud wood was taken, had to be inspected and a certificate had to be issued stating that the wood was free from every insect pest or disease. Then, as an added precaution, the bud wood had to be shipped to Gainesville and re-inspected, and when it was found to free from all trouble, it was shipped on to the three or four places in the state. I feel that there is no possibility of any new disease being shipped into Florida through the importation of this bud wood from California. Prof. Newell saw to that.

The Tangelo

T. Ralph Robinson.

It has been my privilege and pleasure to meet with this society for a number of years as a grower. Before that time for a number of years, I had the good fortune to be associated with the scientific staff of the Department of Agriculture and during a part of that time was associated in work under the direction of Walter T. Swingle whom many of you knew during the early days of Florida.

With the adversity of war, many of the younger men of the Department have gone out into military service and some of the older men have been brought back into the service, we don't know for how long. I have been in Florida long enough to get the sand in my shoes and what regret I have is tempered with the thought that my work will bring me back among you often, and I hope it will not be many years before I will be back here again in a more permanent way.

One of the early results of Prof. Swingle's work in the Department of Agriculture was the creation of the hybrid know as the tangelo.

A cross first made by Messrs. Webber and Swingle between the grapefruit and the tangerine produced the "tangelo." This fruit is being grown commercially in a small way in Florida and warrants special attention at this time. As a class, these fruits resemble round oranges more than either of their parents, and are exceedingly variable, sister fruits from seeds of a single cross-pollinated fruit often being very unlike. Like some other citrus hybrids however, seedlings of the second generation reproduce the parent plant as though grown from buds.

Two well-recognized varieties of these fruits have been tested out and named, and for a number of years past have been distributed to co-operators for further trial. These tangelos are called the Sampson and the Thornton. They have been grown in a small way only, and, until recently, chiefly for home use. Failure to appreciate their proper stage of maturity has served to disappoint many who have experimented with this new type of fruit. When eaten before fully ripe, the fruit is disappointing, the flavor being disagreeably acid. The fruit colors up early and externally appears mature long before it is really ready for consumption.

The Sampson is, under normal conditions, a decidedly late fruit, maturing in Florida about the time of the Tardiff orange, through March, April, and May. The Thornton is considerably earlier, the time of ripening, however, seeming to vary in different sections, though usually not mature before January or February.

Some trees, however, have lately come to notice, the fruit of which is distinctly early, ripening in November and December.

As commercial plantings are being made at several places in Florida, it is important that citrus growers should have a clear understanding of the characteristics of the two types now under cultivation.

The Sampson tangelo is a slightly pear-shaped, thin-skinned, smooth and shining fruit, of pale orange color, and of variable size, though usually larger than an average orange. The pulp is rather acid or sprightly flavored, aromatic, soft and very juicy, of deep orange color that is very striking and characteristic. If properly grown and picked when fully mature, it is a delicious fruit. It is liable, however, to dry out on one side, a fault assumed to be due to sunscald. This tendency will probably prelude its culture on an extensive scale except by experts for a special market. It has been necessary to throw away as culls a large percentage of the crop of this variety, even in the regions where it grows best. There is some evidence going to show that the tendency of the fruit to sunscald or dry out is less pronounced in occasional trees. Care should be taken to secure bud wood from such trees for further propagation.

Bud selection is especially important in taking up a new variable fruit such as the Tangelo.

The Thornton tangelo is of a very different type, a rather rough, thick-skinned fruit of good size, with light or very pale orange-colored juice, and sprightly-flavored pulp. It has little acidity and resembles a tender, good-flavored orange more than a grapefruit or tangerine. When fully ripe, it is so tender that extra care may be necessary in packing it for shipment. In this regard and in its rather free rind, it resembles the tangerine. It may be eaten out of hand, like a tangerine, but is doubtless better when halved and eaten like a grapefruit. It requires no sugar, and the pulp is so tender it can be removed with a spoon without cutting the segments. While the Thornton fruit is not quite as attractive in appearance as the Sampson, it is milder in flavor and by some is preferred on this account. Fruit of both sorts should receive thorough spraying to produce clean, bright fruits. Citrus scab is especially disfiguring on the tangelo, which seems to be rather susceptible to this disease.

An early maturing tangelo of good quality is desirable, to furnish a supply throughout the shipping season and in some locations to avoid the danger of freezing before maturity. Buds of the early Thornton trees referred to above will be tested out in different localities to see if this tendency is inherent or due to local conditions. With the large number of similar hybrids still to be fruited out, there is little doubt that desirable fruits will be obtained, ripening throughout the whole season, from November to July.

The success of these first two hybrids, using the tangerine and grapefruit as parents, has led to the creation of hundreds of additional hybrids between all the Mandarin types of oranges, including several varieties of tangerines, King and Satsuma oranges, and the better types of grapefruit or pomelo. Among the tangelos resulting from such crosses are

some of much promise but further testing is necessary before any of these can be recommended for general planting.

Besides the crosses with grapefruit or pomelo as one parent many other crosses have been made, some of these fortunately using parents recognized now as distinctly canker-resistant under field conditions, such as the calamondin, the kumquat, and the Mandarin types of oranges. Every effort is being made to push these crosses to the fruiting stage and the desirable forms will be thoroughly tested for canker and cold-resistance. For convenience we may speak of this general class of hybrids as tangelos, though they may not be derived either from grapefruit or tangerine parents.

For the canker-infested portions of the Gulf Coast States west of Florida, there is reason to believe that tangelos will be found of considerable canker-resistance. These will serve as substitutes for the very susceptible grapefruit largely grown for home use in this region. Tests now being made at the College of Agriculture, Los Banos, Philippine Islands, using a large number of tangelos supplied from materials being tested in this country, show a wide range of susceptibility, some of the tangelos being decidedly canker-resistant.

The fact that the *Natsu-mikan,* a fruit similar to a tangelo and possibly a spontaneous hybrid of an orange of the Mandarin type with a Japanese pomelo, seems to be decidedly canker-resistant both in Japan, and in U. S., confirms the belief that canker-resistant tangelos may be with reason expected from Mandarin pomelo crosses, especially when one or preferably both of the parents are canker-resistant, as would be the case with a cross between the Satsuma orange and the Hirado pomelo.

Hybrids between canker-resistant pomelos and other citrus fruits were made in Japan in 1915 and subsequent years through the co-operation of the U. S. Dept. Agriculture and of the Imperial and Provincial Agricultural Experiment Stations. The resulting crosses are being tested for canker-resistance both in Japan and in the Philippine Islands.

The principle of bud selection for improving standard varieties is so well established by the work of Shamel, Scott, and their associates in California that it hardly needs emphasizing. Any method of treatment that includes bud variation is promising in securing improved strains. There are some cases where the attempt to cross two species of citrus fruits gives rise to a plant in all essentials like the female parent, that is a false hybrid, but with slightly different characteristics, such as a tendency to increased vigor presumably due to the shock of foreign pollen on the mother plant. This method of securing new strains of standard fruits is being studied, and may prove of value in rejuvenating strains of declining vigor, or securing extra hardiness in a standard strain.

The work already done in citrus breeding has been accomplished working only with plants already at hand—those commonly grown in the United States. A survey of the citrus plants and citrus relatives in other parts of the world (which Mr. Swingle has been making for some years) showed that to make this work

thoroughly effective we must become acquainted with a wider range of these plants. Perhaps the very quality we need in a cross exists in a plant cultivated for centuries in some corner of the Orient. In the case of disease-resistance it is usually found that where that disease has longest existed, nature has built up a means of defense—a form of resistance that enables the species to persist. And so it is in combating such a disease as citrus canker we must look to the plants of the Orient to furnish the best breeding material as a starting point. With the co-operative arrangements perfected with agricultural institutions in Japan, China, and the Philippines, and with Mr. Swingle's inspiration and personal supervision to energize the work, the study of citrus plants in a more comprehensive way will soon be possible. New combinations of desirable characters may then be made on a scale never before contemplated, and the future may hold many surprises in the way of superior fruits as well as fruits of hardy or disease-resistant qualities.

Bureau of Plant Industry, Washington, D. C.

DISCUSSION.

Mr. ——: I would like to know if the gentleman knows anything concerning the Thompson tangelo, which I consider far superior to the two he mentions.

Mr. Robinson: The Thompson tangelo is simply a strain of the Sampson. It is one of the bud sports which has developed in the way other sports develop. As far as I can learn of it, it is a bud sport which is well worth propagation and should be followed up.

Mr. ——: I have had a little experience with all three, and I consider the Thompson far superior to any of the others. It more nearly resembles the Sampson. It is a little sweeter and not so bitter as the Sampson. I think it is the most likely tangelo on the market.

The Drying of Vegetables

Miss Harriette B. Layton.

I had expected to demonstrate canning and drying, but that would take almost all the afternoon, and since most of you have heard a good deal about canning and are more or less familiar with that phase of food conservation, I shall speak only of drying.

There are three simple methods of preserving food: canning, drying, and preservation by fermentation.

There is great need now of preserving all vegetables. Drying is probably the oldest method of preservation known. We are now returning to this old method, but at the same time bringing new steps, so that the present method of drying has some new phases which make the process easier and gives us a better product.

We oftentimes have left over from our kitchen gardens, considerable products that might otherwise go to waste. There may not be enough at any one time to can. But these small amounts may be dried from time to time. This is where drying is of very considerable value, particularly to the town or city housewife.

Cans are exceedingly high; glass also is high in price, both are very scarce. Therefore, as dried products do not require these containers, here is another reason for drying our surplus. I will mention several other very good reasons for drying. The process requires very little equipment. With canning one must have a great deal more. It takes very little time, very little heat, and it is a very easy method. All those things appeal to the house-keeper. The products canned are economical, they appear very attractive when put on the table, and they are very nutritious. Products dried shrink about one-tenth of their volume. This is exceedingly helpful in filling one's pantry, for one can put a great deal away in a very small space. This is also a valuable point in a commercial way. Dried products do not freeze, so that they may be kept in almost any place.

Almost any vegetable can be dried. There are four or five, however, that are especially adapted to Florida. I think, possibly, the first vegetable in the ranks is corn. Corn, especially sweet corn, dries exceedingly well. English peas dry well; beans dry well. A very interesting thing about drying beans is that young and tender beans make a better canned product, the older beans make a better dried product. Okra is also a splendid product to dry. These four vegetables are suitable for drying in Florida: corn, peas, beans and okra. Pumpkin and squash can be dried for pies and puddings.

I think too, it is a good plan to dry a

little of certain vegetables to be used for flavoring, such as onions, parsley, celery and such. Probably a small container such as a small spice or baking powder can would be sufficient to contain enough flavoring to last through the winter.

There are about twenty dehydrating firms in the United States. Dehydrating and drying are practically synonymous terms. The commercial products we get on the market are put up in packages and sold by the half pound and the pound. Corn I believe is about 20 cents per pound. One of the most interesting products, and one of the best known, is the soup mixture. Several companies have been putting up soup mixtures. Each nation wants a special mixture; Italy wants a high per cent of onions; England of peas, etc.

One of the Washington agents was in a store in New York City, and asked if there was a market for dried products. The merchant said, "Oh, yes; we have sold a number of dried products through our store here, but we cannot get them any more. They were 'made in Germany.'" The agent smiled and said, "We can furnish you with dried products 'made in America,' as good as you could get from Germany, but it will take a year or two."

In cutting the older beans, cut them on the slant a little bit. Expose as much cut surface to the air as possible, and cut them from one-fourth to one-half of an inch long. Young beans may be split lengthwise. A vegetable slicer will lighten this work, and make it easier. In making soup mixture, vegetables can be put through the meat grinder.

After the beans are cut, they are then blanched in boiling water. The length of time for blanching depends upon the age of the bean; from three to eight minutes is the rule. The blanching of vegetables is one of the new methods to help out the old method of drying. Blanching is plunging the product into boiling water and keeping them there for a short length of time. A cheese cloth bag or a wire basket may be used for blanching. The heat of the boiling water will kill any insect life or egg that might be on the vegetable. A great deal of the insect life that develops later in the dried product is due to the egg being laid upon the vegetable while it is in the garden. Then, too, blanching sets the albumen in the vegetable thereby helping to retain the color and flavoring. Blanching softens the texture, too, and for these reasons we think it a better method to blanch vegetables before drying.

Tubers, before being dried, should be parboiled. If they are very young, they need be only blanched. Peas and beans and okra are blanched. When the vegetables are taken out of the boiling water, they are spread out on cloth awhile to evaporate some of the moisture. Then the product is spread on the traps and placed in the dryer.

There are three methods of drying; drying by sun heat, artificial heat, and the drying by blasts of air. These methods may be combined. The sun heat, of course, is the oldest type and is still used. An electric fan in the home is a simple example of the second method. This is a rather expensive method. However, if there is a good deal to be dried, that is if one is

drying a considerable amount of products and wants to get them dried quickly, I think the electric fan is one of the best methods by which to dry. It takes as much electricity to dry one carrot as it does one or two bushels of carrots, so the expense is very little when you are drying a quantity.

In drying by artificial heat, it is necessary to have a dryer. There are many types of these. The very simplest is the home oven. A gas oven can be used very nicely for drying. A wood oven is more difficult, because it is hard to get a temperature low enough to serve the purpose. A dryer must have good circulation, in order to bring over the drying product, warm air and carry off the evaporated moisture from the vegetables or fruits. An oven is made on exactly the opposite principle; it is made to retain moisture in order that the food being cooked may not be dry. So when drying in an oven, the door must be left partially open. That is one advantage of a gas oven; the door may be left open at the top insuring better evaporation.

The simplest dryer that can be made in the home is simply a set of shelves put together with heavy wire and suspended over the stove. That is a very excellent way where one has a cook stove in operation once or twice a day. In this way the heat can be conserved. During the time between drying, a piece of cheese cloth should be spread over the drying product to keep it from the dust and flies.

There are various types of commercial dryers. These are more convenient and make the work easier and usually give better results.

The temperature to be maintained varies a little with different products. We always recommend, in any type of dryer, that a thermometer be used. It is very difficult to gauge any temperature with one's hand; of course, after you become expert, you are able to judge the temperature, but what might seem 110° F. to my hand might not seem like 110° F. to your hand. So it is necessary to know exactly what the temperature is.

Begin the drying process at 110° to 120° F. That is just outdoor sun heat. Then gradually increase this temperature until it reaches 140° F. to 145° F. for most products. For some products, apply even higher heat; for others, a little lower. Fruits need from 135° to 140°. Some products, like the shelled beans, require as high as 160°, but the average temperature is from 140° to 145°, carrying it gradually up from 120° to150° F.

Any thermometer that registers as high as 160° will do for drying. It is best, though, to have a thermometer that registers up pretty well, as the oven may get too hot and break the thermometer.

The time for drying varies, the average time being about three hours. Corn takes from four to five hours, and berries take about the same, but most of the vegetables require about three hours for the drying process.

Products then drying should not be placed on top of one another; but they should be spread out. When vegetables are dried sufficiently, they should be dry and have almost no moisture in them, but they should not be so brittle that they will snap all to pieces. They should be somewhat tough and dry.

When the products are sufficiently dried, remove the heat, and put them into a pan or box and let them stand for the rest of the day. The next day put them into another pan or box and mix them. By letting them stand and mixing them for a day or two, the dried ones absorb the moisture from the ones which are possibly not quite dry enough. Pack away in a tight container.

After twenty-four hours, look into the container and examine, and see if the products are moist. If they have not been dried enough, they should be spread out in the oven again and brought up to 140° or 145°, and then repacked. By spreading them out in the oven for twenty minutes at 140°, sterilization will be sufficient. However, if by examination they are all right, seal them up and put them away for future use.

The next important step in drying is the preservation of the dried product. In this climate, especially through our hot, rainy seasons we must take care of the dried products as carefully as a canned product. It must be put in an air tight container.

I am going to suggest to you several containers that might be used in conserving dried products. Oftentimes in the home there are cracked glass jars just slightly cracked, that would break if put into boiling water. These would be very good for putting dried products into; then, tin cans that are rusted a little on the outside. Tin cans, such as baking powder comes in, and spice cans, make excellent containers. The opening can be sealed with paraffin or glued paper. We find certain insects will eat the paraffin or nibble at the glue, but they cannot get into the article contained in the can. The heavy paper containers are very good.

A small container will hold sufficient product for a meal. It is very convenient to put up in packages enough dried products for one meal; these may be labelled and packed away in a lard can or a cake box with a tight fitting cover.

Just as soon as the dried product is exposed to the air, it begins to collect moisture and soon deteriorates.

There are several ways of using dried products. As we have simply taken the moisture from the fruit or vegetable, that is all we must put back into them. There is only about 5% of the moisture left in the vegetable, and it must be allowed to absorb the remaining 95%. That is where we often fail in getting our dried vegetables to be as good as the fresh vegetables. The dried vegetable should soak a long time; sometimes twenty-four hours. This is often too long in our climate, usually from eight to ten hours soaking will make them moist enough to cook quite rapidly. By getting plenty of moisture back into the vegetables, they cook more rapidly.

After soaking, the usual methods for cooking vegetables should be used.

Corn should be blanched from 2 to 5 minutes, according to the type of corn. Field corn should be blanched about five minutes. Corn may be started in the dryer and finished in the sun.

Fruits are not blanched. Blackberries dry better than most of our common fruits. They are washed and spread out for some of the moisture to be absorbed and

then spread on trays in the drier. They should not be dried as dry as vegetables. Begin at about 110° and carry the temperature up to 130°. When they are dried, they should feel slightly moist to the finger, but no juice should come from them. Sometimes apples after being peeled, are put in cold water to keep them from discoloring.

The Turks in New York City use a great deal of okra. They were much distressed last year because they were unable to get dried okra. Florida could raise sufficient okra to supply their requirements.

Through home demonstration work, drying is being introduced into the homes of the people as another method of preserving food. We have tried to get some figures of the amount of dried products put up last summer, but we were not successful, only a report of 100,000 pounds being sent in. In Kentucky 1800 home dryers were made. We did very little in Florida because we were late in beginning, our vegetables were past their best stage.

District Home Demonstration Agent, U. S. D. A., Tallahassee, Fla.

Canning and Why Can?

Mrs. Dora Russell Barnes.

Most of the processes for preserving foods which are practiced today were known long before the reasons for them were understood. It was recognized that molds grew, that liquids fermented and that other similar changes took place, but they were explained on the theory of the spontaneous generation of life.

Canning has become the most widely used and popular means of preserving large quantities of fruits and vegetables. Most industries have existed for a long time but the art of preserving foods by means of canning is distinctly a modern art. We must attribute this art to the French.

In order to secure improved methods of preserving food, in the latter part of the eighteenth century the French Government offered 12,000 francs for the most practical method of preserving food. This offer attracted the attention of some capable men, among them Nicholas Appert, an expert confectioner, brewer, and distiller. He worked from 1795 until 1804 before he attained success. He continued his efforts using many substances, and so perfected his art that in 1810 he was able to publish his results and was thus awarded the 12,000 francs.

He did his work so well and the method was so simple that others began using it as early as 1815; and in 1820, it was put into commercial practice. Although this this work was primarily conceived as a war measure to preserve food for the military and naval stores, the possibilities and advantages of having food preserved in such a wholesome and palatable manner attracted much attention and was soon used in the household. The use of canned goods has so increased until at present, the value of the canned products alone in this county amount to $250,000,000 annually.

Canning is the art of preserving a food through sterilization by heat and maintaining it in that condition in a hermetically sealed container. In its highest development, it is an attempt to maintain the food in as nearly its natural condition as possible, or in the condition in which it is usually consumed.

Previous to canning, men had turned their attention to preserving food by means of drying, pickling, smoking and preserving in sugar. Each of these methods was applicable to certain products but was subject to changes in character and was attended by so much spoilage that methods which would overcome this were desirable.

Appert's method was to pack his products in bottles, add sufficient water to cover them, then place them in water bath and heat gradually for varying

lengths of time, depending upon the product in the bottle. Appert did not know why the food kept when put up in this manner but supposed it to be due to the exclusion of the air. He wrote, "Absolute privation of the contact of external air is necessary after the internal air is made of no effect by proper application of heat by means of a waterbath." In his day science had not determined why canned food kept. Though his explanation has proved to be wrong, his method was correct.

Gay-Lussac, the foremost chemist of the time, was appointed by the French Government to investigate why the food kept. He reported that the reason that food spoiled was oxidation changes, and that by excluding the air these changes could be prevented and thereby the food saved. This theory was accepted, and the true explanation was not known until the advent of the new science of bacteriology. We now know that all foods, water, air and the containers are bearers of bacteria and other micro-organisms; that the effect of the heat is to destroy them, and that the hermetic container merely keeps them out. Science has also taught us that all organisms are not killed at the same temperature; that some spores are very resistant to heat; and that it requires a high temperature to kill them while others are killed at a very low temperature. These facts make it clear to us why products like corn, pumpkins, beans etc., need a very high temperature for a greater length of time than raspberries, blackberries and other fruits.

The first person in this country to make application of bacteriology to canning was Dean H. L. Russell of the University of Wisconsin, in 1895. He was followed by Prescott and Underwood, at the Massachusetts Institute of Technology, in 1896.

Appert's methods were so simple that canning was begun in Europe in 1807, and in this country in New York in 1819, and in Boston in 1820. The first canning factory was opened in Baltimore in 1840, one in Maine in 1841, one in Cincinnati in 1860, and on the Pacific coast in 1878. It is interesting to note that all of the pioneer factories started with fish goods as their primary pack, with vegetables and fruits as incidental. Now we have about 3,000 factories in the United States with an annual output of 3,000,000,000 cans.

The canning in the home and factory are not so very different. In the factory they are prepared with special machinery to handle larger quantities of food, to do better grading and to keep the products at a more uniform temperature. The housewife uses flavoring and spices which are not used in the factory. As a usual thing vegetables require a higher temperature than fruits; most vegetables require being heated above the boiling point, while with fruits the reverse is true, their flavor being conserved at a low temperature.

As to the container, Appert used glass. Peter Durand is known as the father of the tin can. There is no such thing as a best container for all products, for some things are better stored in glass while others are better in tin. Glass has its

drawback on account of its ease of breaking, increased labor required, added weight, and higher freight.

The tin can is pre-eminently the container of commerce, and like the glass jar, has gone through many stages of development. It is not an ideal container but it is the most practical that has been evolved.

There seems to be a general assumption that all canned foods deteriorate with age. This is probably true within certain limits but much depends upon the character of the product, the method of preparation and the condition of storage.

The original form, flavor, color and texture of fruits and succulent vegetables are retained to a greater degree by canning than by any other means. For this reason certain flavored vegetables are most attractive when canned. Canned foods are ready for immediate consumption, which makes it very convenient for the housewife.

Never before have women faced such an opportunity for service in producing and conserving foods. In order to make this world safe for democracy we must win this war and food is one deciding factor. The other two great factors are money and men. Money is being spent in unlimited sums and we are reverently dedicating our men to battle for a free government. Money and men can be obtained by organization and as a nation we have demonstrated our ability to organize. But there is a greater task than organizing and equipping effective armies. That is to modify the food habits of the 100,000,000 of our people so that the increased supplies of food needed may be furnished. Only through co-operation can we do this.

Co-operation is absolutely necessary for there is not enough food in the world to meet the world's needs. This is a fact, whether the war be long or short and regardless of its outcome.

Our allies cannot raise enough to supply themselves so we must send them all that we can spare; and in order to do this we must make a few definite changes in our daily food habits. Neither the producer, dealer nor consumer can effect this alone. The women of the households cannot bring it about, nor can it be done by legislation. But it can be done by co-operation and universal, generous, wholesouled decisiveness. This co-operation must begin in the home; mother, father and children co-operating.

We must not only meet home demands but also provide for those whose food production has been cut short by this war. The Government is making an appeal for us to increase the acreage of our gardens in town and country. The responsibility of wisely utilizing this yield rests upon the women and girls in the home. By adding food to the home supply, we release more commercial products for export. Canning furnishes an important means of food conservation. The use of fresh fruits and vegetables are at all times essential to health. At certain seasons they are abundant and are actually let go to waste; while at other seasons they are scarce and expensive. So it is important to preserve large quantities of the perishable fruits and vegetables to use

during the winter; and not only to preserve them, but also to plan the most economical way of keeping the products.

As I have said food is absolutely essential to win this war. In the past years the South has drawn heavily upon the North for its food supply. It should cease to do this. If the South should reduce its food production and draw more heavily upon the North the result would be little short of disaster. "Indeed there is a possibility that it might prove fatal to our country in this war." Failing to produce our own food not only means drawing on the North for supplies but means a greater burden to transportation. This no patriotic citizen should tolerate. Again if the South fails to produce its own food and stock feed and has to exchange cotton for these it will be poorer than richer.

We may say then, if food exhaustion is so universal, may we not expect a speedy collapse of Germany's resistance? We may answer like this. Before this war Germany and her allies were almost four-fifths self-supporting. England was only one-fifth, France one-half, and Italy probably two-thirds. Germany was a nation given to overeating so her first decrease in food was really a benefit to her. During the past two years she has suffered severely; but in spite of that and of her bad harvests she seems to have been able to meet the emergency; and if reports are true, can do so indefinitely. She is using the western fringe of Russia, cultivating much of Belgium and a large acreage in northern France. Her conquest of Roumania has given her possessions in the plains around the lower Danube, which is perhaps the most fertile soil in the world. Then Germany has a wonderful food organization and no one in her domain dares to waste a crumb.

Considering these facts it is folly for us to assume anything other than Germany's power to endure.

The moral is clear. We must reduce our food consumption and not fail to feed our allies in this great hour of need. Loyalty to those who are fighting for us and duty to ourselves, counsel and oblige us to economize. We must all do our bit. But in applying the measures, our nation's chief reliance will be the women. They direct the households of our land. In this great war, as in all wars, their great duty is the all-important task of food conservation.

Every woman can at least have her garden and fill her pantry for another year, thus saving that much for our allies. So let us:

"Sing a song of canned goods on the pantry shelf,
Every hustling family just goes and helps itself;
Canned things for boiling, for stewing and for pie—
Don't you feel sorry for those folks who have to buy?"

Bartow, Fla.

Florida Feeding Herself

Miss Lucy Cushman.

Every individual, every home and every State is making a war record. Whether this record is a credit or a shame depends on how each is strengthening the national defense.

The government is pledging the lives and fortunes of the American people to defeat Prussianism and to make the world safe for democracy. Kipling says that there are two kinds of people in this world—humans and Germans. We are in a great struggle, and if each individual, each home and each State does not completely fulfill its war duty, this struggle will be prolonged in direct proportion to the total amount of neglect.

You say, "We must win this war." Yes, but first we must have the will to win; for, above material things, is the mind of man. The minds of the people must be made to see clearly their specific duties; and that each duty helps to complete the program that will give us the victory just as surely as each little piece of glass adds color and completeness to a mosaic. Each individual may help make up this mosaic of Florida's duty to the government and to the world. The war service of Florida is—Florida should feed herself.

Every year Florida imports an enormous amount of foodstuffs. Upon close study of these foods you will find that they can either be produced in Florida or can be replaced by foods of equal nutritive value that can be raised in this State.

The suffering in the North from lack of coal and food throughout the winter of 1918 was due in great measure to the lack of transportation facilities. It ought to forcibly impress upon us that we must save in every way possible in transportation.

Director-General McAdoo has already given warning that transportation conditions may be more difficult in 1919 than they are this year. Our military movements will have first consideration; and we are informed that 300,000 cars are needed during this year to carry food for the armies. Fully eighty per cent of the rolling stock of the two large Eastern railroads has recently been reported as being used for war freight.

If Florida can feed herself, save in transportation and keep her people from serious privation, she has indeed awakened to the realization of her specific duty.

We find two great results of any war—the loss of life and the decrease in production. With forty millions taken from the fields of production and engaged in the business of destruction, every effort must

be made that this destructive work does not surpass constructive work.

The war duty of Florida in this phase would first call for the home garden. Each home should, as far as possible, produce its own vegetables. In this way the market supply is not drawn upon and more is left for the soldiers. In these home gardens, home labor must be employed. Labor is too scarce to permit of hired help in kitchen gardens. Perhaps whether one has planted a garden or not has seemed a personal matter. It can no longer be classified as such. It now becomes a state and even a national affair.

Are the people of Florida going to ask someone else to raise their food and to transport it into the State when every available railroad car is needed to help carry on the war? Florida, with her climate and soil so well suited for the raising of substitutes for the foods which the government is asking us to save, can aid materially in the general conservation movement. Our conservation problem is largely one of substitution.

For the wheat we can grow corn, and corn can be worked up into so many forms of food. Peanuts grow well in Florida, and this food is coming to be used more and more extensively. People are just becoming acquainted with them. Rice, sweet potatoes, Irish potatoes and dasheens will help to make wheat unnecessary on our bill of fare.

For meat we have an abundant supply of fish, and every place in Florida can get all it needs. It can be distributed throughout the State as easily as it can be transported out of the State. Eggs, milk and peanuts can also be used to replace meat which is needed for our allies.

Florida cane syrup should come into common use in Florida. It is a native product, and should be favored in place of the chemical product used so extensively in the form of Karo syrup.

At this time we are practicing conservation by allowing nothing to go to waste. This means the canning and drying of vegetables that cannot be used fresh. Every home should fill its pantry. The government is calling for 25 per cent of all canned products and 35 per cent of canned tomatoes. We can serve our government in no better way than by canning our surplus, each housewife facing her duty as an American citizen in her own kitchen.

Our stores are filled with special brands of canned products, many of them from other States. Can not Florida people put out a product which is as good and which the stores can sell as easily as Northern products? Leave New York brands for New York people. Let Florida people eat from cans sealed in Florida. This problem must be solved, and the storekeepers and the housewives educated to it.

Our armies only represent 40 per cent of our military efficiency. Sixty per cent of our efficiency depends on the people at home who are fighting this war just as truly as are the khaki-clad boys in the trenches. Florida is ready to do her part to make her war record a noble one. And in the first part of her record should stand the words, "Florida Can Feed Herself."

Urban Worker, U. S. D. A., Miami, Fla.

Avocado Diseases

H. E. Stevens.

A few fungus diseases of a troublesome nature are reported on the avocado in the different countries where it is grown. Among these, Rusty Blight, Root Rot and Anthracnose appear to be the most serious. The first two diseases, perhaps, do not occur in Florida, but Anthracnose or closely related diseases have caused some injury here. The pests of the avocado are not well known at present, for there has been very little work of an investigational nature in this direction in the past. While the plantings were confined to a few seedling trees around dwellings or in the gardens, diseases attracted only passing interest. Under such conditions the opportunities for the development and wide distribution of diseases has been rather limited.

Since this important fruit has lately come into prominence as a commercial crop, there is a demand for information concerning its enemies, and practically a new field has been opened up for the study of its diseases. In plants growing on a commercial scale, the conditions are more favorable for the development and spread of diseases. We may expect to find the avocado more or less troubled with pests where it is brought under cultivation and large numbers of trees are collected together.

In general the domestication and cultivation of plants make them more susceptible to disease, for usually favorable situations are afforded for the diseases as well as for the plant growth. Domesticated plants are much less resistant to attacks of disease than those growing in the wild state. Through domestication we get an increased yield and better product, but usually at the expense of a resistance to diseases or other external factors. Thus, while the avocado in the past appeared to be reasonably free from diseases, in the future it may have its full share of troubles if proper steps are not taken to avoid them. This is not a pessimistic or discouraging view of the situation, but a condition that should be realized and met. If the avocado is subject to certain serious pests, the person who attempts to grow avocados should know what these are and the necessary steps to avoid them.

Some of our more serious citrus diseases might have been prevented from becoming so widespread over the State if the citrus growers had realized in time their serious nature, and the consequences that were to follow. The same fate is likely to happen to the avocado, unless the present growers see to it that diseases are not allowed to develop and spread promiscuously.

The avocado in Florida has not been troubled seriously with fungus diseases in the past, although a few have been recognized as troublesome at times. These may be classed as leaf spots and fruit injuries, and come in the group of Anthracnose diseases. They have been given but little study and our knowledge concerning them is rather limited. The more common types of injury have been reported as follows:

Leaf and Fruit Injuries: Leaves and frequently fruits are attacked by a fungus which is probably a species of Gloeosporium. The affected leaf is usually attacked at the tip, and the disease gradually spreads until a greater part of the blade is involved, when the leaf falls. Severe attacks may cause considerable defoliation of trees and result in the death of young terminal twigs. Fruits may be attacked when small, in which case severe shedding may follow. If the more mature fruits are attacked, a brown spotting is produced and the skin may crack.

Another common type of injury, frequently noted on the fruits, is referred to as Anthracnose by some of the growers. This type of injury is very similar to Melanose of citrus fruits in general appearance. It is superficial and appears in the form of dark, reddish brown, caked masses, on the surfaces of affected fruits. The markings are hard, compact, and the surfaces are cracked or broken. The injury may cover only a part or the whole surface of the fruit. It makes an unsightly fruit, but apparently does not affect the quality. This disease is apparently caused by a fungus, perhaps a Gloeosporium or a closely related species.

Another fungus, a species of Colletotrichum, is often observed in diseased spots on leaves and fruits. This fungus is closely related to Gloeosporium, and the injuries with which it is associated resemble those caused by the latter fungus. It is probably the cause of some of the injuries that are classed as Anthracnose.

In the control of these leaf and fruit spots, Bordeaux Mixture has given satisfactory results where it is applied in time. As soon as the injuries begin to appear, sprayings should be made and continued until the disease is checked. Two or three applications may be necessary, made at intervals of two or three weeks apart. If the fruit is near maturity, it is advisable to substitute the Ammoniacal Solution of Copper Carbonate for the Bordeaux Mixture, to prevent any disagreeable stain that may result from the use of the latter. Aside from spraying, all dead wood should be kept out of the trees, as this is likely to harbor these fungi from one season to the next.

In addition to the above troubles, two apparently new and undescribed diseases of a more serious nature have recently come to our attention, and both have been given some study during the past year. One is a fruit spotting that has caused considerable loss of fruit during the past season, and the other is primarily a disease of the young, tender foliage, which has been described and named Avocado Scab. Both of these diseases give promise of proving troublesome, and they may

cause serious injury in the future if they are not controlled.

An extensive field study of these two diseases is being made in co-operation with the State Plant Board. Through the efforts of Mr. Henry Schumacher, one of its inspectors, much valuable information has already been obtained concerning their occurrence and distribution. Progress has also been made in our laboratory studies, and the results have been briefly summarized in the following pages:

FRUIT SPOTTING.

Our studies of the fruit disease are still in the preliminary stage, and very little information of a definite nature can be reported at this time. The disease was first called to the writer's attention on August 31st of the past year. Some field and laboratory studies were soon under way, but the season was too far advanced to accomplish more than a beginning at that time. A more extended study of the disease is planned for the present season.

A certain amount of information, however, has been accumulated concerning the nature and occurrence of this disease, which may be of use to the grower, and it is thought advisable to report such at this time.

This disease will be referred to as Fruit Spotting for the present. It is thought best to defer giving it a permanent name until the cause has been definitely established, in order to avoid confusion or conflicting of names in the future.

This spotting is apparently a troublesome disease, and one that may cause serious losses in fruit. It is chiefly a disease of the fruits, and thus far it has been found mainly on the seedling avocado, although a few cases of the disease have been observed on the Trapp. It seems to appear about the time the fruit is approaching maturity, and the spots are fully developed when the fruit has ripened. A decay may rapidly follow after this period.

According to reports from those in a position to know, this disease has been occasionally observed during the past four or five years. It seems to have been unusually abundant and more severe during the past season, and in a few cases as high as ninety per cent of the fruit on a tree was found affected with the disease. Affected fruits are practically worthless for shipping, since they are not only unsightly, but decay rapidly when packed and shipped.

Appearance: The effect on the fruit is quite characteristic, and if the disease is once observed it will not be easily mistaken for some other trouble. The injury occurs in the form of definite spots scattered over the surface of the fruit. The spots are round, brown to dark brown or black in color, and vary from one-eighth to three-fourths of an inch or more in diameter. The surfaces of these spots are slightly sunken, and composed of hard, dry, corky tissue, which penetrates the skin of the fruit and into the meat. The surfaces are often cracked or fissured, and in some cases a zonated effect is observed. When once formed, the spots do not appear to increase in size, on the surface of the skin, but a decay of the meat below may rapidly follow, espe-

cially if the fruit is ripe. Affected fruits may show from a few to many spots of various sizes, and frequently a number may grow together, forming irregular patches, the surfaces of which are deeply cracked or broken. Severe attacks on less mature fruit may cause it to become misshapen or undersized.

A spotting very similar to that on the fruits has been observed on the green bark of twigs, and a typical leaf spot is also found in connection with the disease.

Cause: While the cause of the disease has not been definitely established, our investigations would lead us to believe that it is due to a fungus. Two fungi have been isolated from the diseased spots on fruits and grown in pure cultures. These have been obtained more or less constantly from the diseased specimens examined thus far. Both of these fungi have been inoculated into green or nearly mature fruits, under laboratory conditions, but the results obtained have not been conclusive. In these experiments it was not possible to hold the fruits in the laboratory for a sufficient lenth of time to allow the disease to develop. These inoculations should be repeated in growing fruits on the tree before definite conclusions are drawn, and this work has been delayed until the coming season.

Control: With our present knowledge of fruit spotting, very little can be suggested in the way of effective control measures. Assuming that it is a fungus disease, the use of some fungicide should prevent injury if it is applied at the proper time.

Since the disease is evident on the more mature fruit, infection probably takes place some time after the fruit is half grown. Perhaps an application of Bordeaux Mixture, made when the fruit is in this stage, would prove more effective than earlier or later spraying, unless the fruit was protected throughout the season. If the spraying is delayed until the fruit is nearing maturity, it is advisable to use the Ammoniacal Solution of Copper Carbonate rather than Bordeaux Mixture, to avoid staining of fruits.

AVOCADO SCAB.

Avocado Scab is of more than ordinary interest, owing to its close connection with Citrus Scab, and the fact that it has come into existence within the past three or four years. It is in all respects a new disease that has had its beginning here in Florida.

Scab was first called to the writer's attention more than two years ago, but at the time appeared to be unimportant. Since then it was reported from time to time, and during the past few months considerable laboratory study has been given to this disease. The cause has been determined, and the disease was described and reported in Press Bulletin No. 289 of the Florida Agricultural Experiment Station.

Scab is chiefly a disease of the tender growth, and at present it is found more abundantly in the nurseries, where it is particularly severe on seedling plants. It also attacks budded varieties in the nursery. The disease has been found on young and old bearing trees in the groves, affecting the leaves, and in a few cases an

injury was observed on fruits. At present it is more common in the nurseries, but it may soon prove a serious pest in the groves.

Appearance: Scab forms definite spots or patches on the young, tender leaves and shoots, and severe attacks may cause the foliage to curl or become distorted. The more mature leaf tissue is not affected, but old leaves will be found bearing spots that were formed when the tissue was young.

The spots are usually small, raised, circular to irregular, purplish brown to dark in color, and may vary from a sixteenth to an eighth of an inch in diameter. They may appear scattered over the surface, or several may grow together, forming irregular patches. The spots penetrate the leaf tissue, and they are visible on both sides. They are usually more prominent on the upper surface of the leaf, in which case the under surface of the spot will be slightly bulged and marked by a discolored area. The centers of the spots are composed of dead cells, more or less spongy in character and brownish in color. In the earlier stages the surfaces may show a fuzzy, whitish growth—the fruiting parts of the fungus.

The surfaces of older spots are darker in color, and frequently covered with a dark webby fungus growth. On young shoots and twigs the spots appear more elevated, small, oval, dark purplish brown to black, and have comparatively smooth surfaces. This same type of spot is observed on the fruits.

Cause: Our study of this disease during the past few months has resulted in determining its cause, which was found to be a fungus. This fungus has been isolated repeatedly from the diseased spots on avocado leaves and grown in pure cultures. Infection experiments have demonstrated the parasitic nature of the fungus which has reproduced the typical symptoms of the disease under laboratory conditions. Spores from pure cultures of the fungus have been applied to tender avocado growth in the greenhouse, and when a proper moisture supply was maintained, these have consistently produced the typical spotting of Avocado Scab on the foliage to which they were applied. Healthy young foliage under the same conditions as that treated with spores, except that no spores were added, remained perfectly free from the disease throughout the experiment. These experiments have been repeated several times with similar results.

In culture and growth habits the fungus obtained from Avocado Scab resembled the Citrus Scab organism, and a close relationship was at once suspected. *A series of experiments were made, which demonstrated that Avocado Scab and Citrus Scab could be produced by the same fungus.* It was found that when spores from a pure culture of the Avocado Scab fungus were applied to tender citrus foliage under moist conditions, typical citrus scab spots appeared on the leaves and stems thus treated. The fungus was reisolated from these infections on citrus foliage, and again applied to healthy avocado foliage. Avocado Scab developed on the foliage treated in this manner.

Infection experiments on the avocado

with pure cultures of the citrus scab fungus have not been so conclusive thus far. When spores of this fungus were applied to avocado foliage, a surface injury usually resulted, but the typical spots of avocado scab failed to develop.

Apparently certain strains of the Citrus Scab fungus are capable of adapting themselves to the avocado, and this condition has come about within the past few years. Or possibly certain spores from any strain may be capable of doing the same.

It is plainly evident that the Avocado Scab fungus is no other than *Cladosporium citri*, which causes citrus scab. The two fungi agree in structure and growth habits, and both are parasitic on citrus.

Control: Only tentative control measures for Avocado Scab can be suggested at the present time. Spraying with Bordeaux Mixture for the disease in the nursery has given good results in some cases, in others less satisfactory. If the new growth can be protected while it is putting out, the disease may be largely avoided.

The sprayings should be made when the foliage begins to put out, and continued until the leaves are nearly developed. The 4-4-50 Bordeaux Mixture may be used and applied at intervals of ten days or two weeks, or often enough to keep the young foliage well protected. The fungus develops more rapidly during cool weather where moist conditions are provided. Shade and a crowded condition of the trees also seem to favor the development and spread of scab.

It is not advisable to locate the avocado nursery too near the citrus grove, especially if citrus scab is present.

All necessary precautions should be taken to prevent this disease from spreading, and groves and nurseries that are free from it should be kept so.

Gainesville, Fla.

DISCUSSION.

Mr. Rolfs: It seems to me we should make our efforts as avocado growers to limit the scab as much as possible, and be sure that our citrus groves which are near the avocado nursery are free from scab. Here we have a peculiar situation, very much as it occurred possibly twenty or twenty-five years ago when the citrus scab, which had confined itself to the sour stock, gradually varied until now it is as bad on the grapefruit as on the sour stock. It appears that this fungus is adapting itself and producing a strain that will attack avocados; it first developed a strain that could attack the grapefruit, and now another strain has developed that will attack the avocado.

Mr. ——: Is there any way to prevent the casting of bloom? I know of two trees that bloom freely, but cast the bloom. Is it a fungus or insect trouble? Also does tear stain and mela- will attack the avocado.

Mr. Stevens: The casting of the bloom may be due to several conditions. The first way is to ascertain what is causing the trouble. As I mentioned in my paper, we are not well acquainted with the avocado diseases. I should think by spraying there would be a tendency to check the trouble.

I suppose you are referring to tear staining and melanose as they occur on citrus. Yes; there is a disease of the avocado which resembles the melanose of citrus. We would be glad to examine any specimens if you will send them in, and advise you to the best of our ability what the trouble is.

Mr. Hart: I would like to ask if the others have had any experience with the scab attacking the June bloom of oranges? I have had as plainly marked cases of scab on the June bloom as I ever saw.

Mr. Stevens: Scab is not supposed to attack the ordinary sweet orange but there are cases where an occasional patch has been found. It appears to be more or less common to all members of the citrus family.

Mr. ————————: We had a similar experience with the Tardiff orange. There were some fifteen or twenty boxes with well defined marks of scab.

Mr. Hart: This fruit I am speaking of was on the sour root. We had two or three other varieties affected; I am not sure what they were.

Community Spraying

Max Waldron.

When a speaker stands up, takes a paper out of his pocket and starts to read it, his standard apology for doing so is that if he did not confine himself to his manuscript he would talk on far beyond his allotted time. My apology, however, for reading this paper is that if I did not do so I would not be able to stand before you for more than about three seconds.

The subject which has been assigned to me is one that has never before been discussed at these meetings, and as far as I know, the average Florida citrus grower knows very little about it. The present speaker is an average Florida citrus grower.

Before we discuss the question of the feasibility of community spraying, it might be well to recite a few instances where it has been successfully applied. Whenever any subject is discussed pertaining to some beneficial practice in citrus culture which the Florida grower should adopt, the classical thing to do is to refer to California, where such practice is usually found to be already in operation. Therefore, in order to follow the rules, I shall refer to California. In that State, as you perhaps know, each county has a Horticultural Commissioner, directing from one to thirty assistants, who are given full authority to enter any man's grove and fumigate, spray or destroy any tree which is liable to menace surrounding trees or groves. The cost of this service is charged to the property owner. That is what one might term benevolent despotism. In other words, the State considers itself bound to protect the health of its citrus trees just as it protects the health of its citizens. This is apparently an ideal system to adopt, and we trust the time is not far distant when our own Plant Board will be granted similar powers.

Other instances might be cited where community spraying or a modified form of it in use. In many cities, notably Washington, D. C., owners of spray wagons drive along the streets and spray backyard gardens by means of very long hoses attached to their power sprayers. When the New England States finally realized the seriousness of the brown-tailed moth and the gypsy moth upon their lovely shade trees, and the San Jose scale upon their fruit trees, they undertook extensive eradication campaigns.

In Florida one of the best examples of community grove work, including spraying, is at Lakeland Highlands, where about 1,200 acres of young trees are being developed co-operatively. Persons who purchased land in this vicinity voluntarily

established an organization to manage their groves. By paying a certain sum per acre per annum they have these groves cared for by experts. Any money left over above actual expenses is divided pro rata among the members of the Association.

Other very good examples of community spraying in Florida are at Lucerne Park and at Lake Alfred, both in Polk County. These places have about 1,000 acres each under one management, and the spraying is done systematically and economically. The property is divided into many small groves and owned by people living all over the country. If the spraying was left to each individual, one can readily imagine the inefficiency which would result. At Lake Alfred the development work is done for actual cost, this being a service feature of the local real estate company; while at Lucerne Park it is done on a contract basis. Both places, however, furnish excellent examples of what fine-looking groves can be produced by co-operative community work.

These plantings are practically contiguous to other groves badly infested with white fly; yet, because of their thorough spraying, none of these insects have as yet entered them. It is also to be noted that there is practically no citrus scab at these places, yet some of the surrounding properties are quite badly infected with it. The unusually fine condition of the groves where co-operative community spraying is practiced is eloquent testimony to the truth of that old axiom that one executive head is better than a hundred. Two heads are better than one when it comes to thinking out problems, and that is why we have these meetings of the Horticultural Society; but when it comes to the executive administration of any business, then success can only be achieved by a single management. When a community resolves itself into a unit to spray their groves, then you can be virtually assured that these groves will be well sprayed.

But when we essay to establish any voluntary co-operative system among growers, we bump into the old stumbling block which some folks term personal liberty, but which should more properly be called "orneriness." Florida grove owners, like most tillers of the soil, are a very independent lot, and in every community there are usually two or three contrary ones who refuse to co-operate with the crowd. It might be said that these contrary ones do not always hail from Missouri. In fact, their native habitat is not nearly so far away, if you know what I mean. In view of this inborn tenacity of will among a few of our neighbors, it would seem as if the voluntary community spraying would be a little difficult to institute. One unsprayed grove among a hundred sprayed ones constitutes a menace that will often annul the work done in the sprayed groves. Under these circumstances, a little night riding on a spray wagon would be quite the proper thing. There is nothing like being sociable.

In districts where the groves are widely scattered at considerable distances apart, community spraying would hardly be considered practical, owing to the time lost in transferring from the different properties. But in localities where the plantings are

practically contiguous, and there are many such districts in Florida, it would appear that a great saving would be effected if all the grove owners would club together, buy some power spray wagons, hire competent mechanics to run them and grove experts to direct their work, purchase their spray materials in bulk at reduced prices, and thus equipped, keep their groves properly sprayed.

But systems of this kind, good as they are, would still fail to include the spraying of groves owned by that little group of willful men who, by refusing to keep their trees free from diseases and insects, deliberately endanger the citrus industry of the entire State and are the cause of other growers spending a great deal more money on disease eradication than would otherwise be necessary. They make fit companions for those unfeathered bipeds of the male sex who are so inconsiderate of other people's property as to allow their livestock to roam at large. The government should establish an internment camp to keep people like that.

I especially wish to call your attention to the fact that by this co-operation in spraying, the community could afford to purchase a power sprayer and thus discard the prehistoric hand sprayers, which are the only kind that many owners of small groves are now using. Hand-sprayers are of little use on trees infested with mealy bug, cottony cushion scale or aphids.

One characteristic of the Florida citrus industry is the multitude of small groves which are owned by non-residents or by persons who spend only their winters here, return North in the spring and leave their groves in charge of some unscrupulous caretaker, or in charge of our glorious Florida climate and a handful of Australian lady beetles. These groves are usually left unsprayed, and thus menace the surrounding ones belonging to men who are exerting all their efforts to produce an abundance of clean fruit on healthy trees. It would seem, then, that an intelligent system of state-wide compulsory community spraying would be the only satisfactory way to control the ills and pests which must be combated in our rapidly increasing citrus districts.

Therefore, we Florida growers who are here the year around and make the citrus industry our principal vocation, should endeavor to arouse popular sentiment, followed by legislation, which will enable the county or state to step in and clean up infested groves. We already have a very efficient organization in our State Plant Board which could carry on this work. There is no reason why their remarkable success with canker eradication could not be extended to include the whole field of citrus pests.

Would it not be advisable for this Society to go on record as favoring the adoption of legislation to effect compulsory spraying of groves where the owner refuses to this spraying? It would mean to a large extent the insurance of the citrus industry for Florida; it would mean that Florida fruit would be better and brighter than it has ever been; it would mean that tourists would no longer comment upon the diseased condition of some of our groves. In short, it would mean a revitalizing of the citrus industry, and would do away with that old landmark—the neglected grove.

Lake Alfred, Fla.

The Care of Spraying Machinery

W. W. Yothers.

The depreciation of spraying machinery in Florida is very great. In many instances this amounts to from 50 to 75 per cent per annum, and on an average it is not far from 20 per cent. This depreciation is due to several contributing factors.

The ordinary wear and tear on machinery is much greater in this State than on the average. This is due to the sand getting in the gears and bearings, and to the excessive humidity of the climate, which causes the iron parts to rust. The greatest factor, however, is gross neglect on the part of the grower. Many years' observation would indicate that the average spraying machine receives little attention, or, at best, improper care. Many growers buy a machine, use it one season, and then put it in the shed without any oiling, painting or washing whatever. The next year they are surprised that the machine is not in working order, and buy such new parts as have rusted out or that have been so corroded by the sprays as to be useless.

The suggestions given herein have been obtained from many different sources; manufacturers of tanks and machines, experts along various lines, and from growers in all parts of the State. Our own experience with many different makes of machines has also been of value in preparing this paper.

If the instructions given herein are followed, they will reduce the depreciation so that it will be not far from 10 per cent. The additional cost for the care given is very small as compared with the results in prolonging the usefulness of the machine. This will reduce the cost of spraying considerably, not only in that new machines will have to be purchased less frequently, but more especially in that delays occurring while the spray is being applied will be largely eliminated.

GENERAL CONSIDERATIONS.

Paint: So far as is known to the writer, no experiments have ever been conducted with the view to determine the kind of paint that is most resistant to the various spray chemicals. It is, however, quite universally known that red lead and linseed oil is exceedingly effective for the prevention of rust and the preservation of wood. Graphite and asphalt paints have also been recommended as highly effective, but these do not have the weight of authority to recommend them, as does red lead; so, therefore, until more is known about the use of paints for spray machines it would seem advisable to recommend the former.

All pipe fittings, plugs, and in all places

where unions are made by means of thread, the parts should be treated with graphite paste. This will render them more easily unscrewed if it is ever found to be necessary. It will also prevent rust. Red lead is also satisfactory, but the parts thus joined are a little more difficult to separate than where graphite paste is used.

Protection from the Weather: The machine should be kept under a good shed when not in use. The wet weather in summer is most destructive to both the woodwork and the metal parts. The sun during the winter and spring will cause the tank to check and warp if left without covering.

Cleaning: As a general proposition the machine should be carefully cleaned when the spraying season is over. The outside should be washed or scrubbed to remove dirt and any injurious chemical. All the spray material should be removed from the tank, pump and other parts, and the entire machine then washed with clean water. This should then be drained out and cheap oil run through the pump.

CARE OF THE TANK.

There is a decided difference of opinion as to whether clean water should be left in a cypress tank when not in use. All manufacturers of cypress tanks were positive in their statements that the spray tank should be carefully washed out after the spraying was over and left with considerable clean water to prevent drying. The Forest Service was also of the same opinion. A representative of a spraying machine company did not think this advisable, since the water in many machines would find its way into the pump and cause rusting and general depreciation of all iron parts. If water is present in the pump and pipes when low temperatures occur, much serious damage might follow from bursting pipes. It may be that water should be added if the pump is connected with the tank by means of a suction hose over the top of the tank. If it is connected underneath, it might be better to leave the tank without water, and at the beginning of the next spray season soak it up again. The writer believes that when a tank is not used for any considerable length of time the water should be left in it.

The outside, including the hoops, should be painted as often as required. One manufacturer suggested that the new tank be treated on the inside with a solution of paraffin in gasoline. The hoops should be kept tight when the machine is being used, but it is not necessary to bury the nut in the wood. When the hoop is being tightened it should be tapped slightly. This will make the planks of the tank tighter than too much tightening of the nut. We have seen cross-pieces broken in this manner.

CARE OF THE WHEELS AND OTHER WAGON PARTS.

We have seen the spokes or iron wheels on farm wagons and spray machines that had rusted completely through. This rusting is hastened by the corrosive action of some of the spray materials, such as lime-sulphur solution and some fungicides. To prevent this, paint them with

red lead and linseed oil. Mr. E. H. Williams treats the wheels of his machine with hot tar with perfect results. The tongue, axles and all other parts of the wagon should be painted or otherwise treated as often as required to keep in a state of perfect preservation.

PUMPS.

The two essential things in the care of a spray pump are the prevention of the chemical action of the spray materials on the parts and the prevention of rust. Ammoniacal copper carbonate is very destructive to brass valves and seats, and if it is used extensively, iron ones should be substituted. Lime-sulphur is fairly corrosive and appears to be especially severe on cut-offs and nozzles. Bordeaux is also somewhat injurious. To prevent this, run a gallon of machine oil through the pump, but not through the hose, just before spraying is begun. The oil sprays do not injure the pump. After spraying with any spray, run clean water through the pump and hose until it comes out perfectly clear; then open the drain cocks to permit all the water to flow off from the cylinders. It will be well to leave open for an hour or more before replacing the drain cocks, after which a gallon of cheap oil should be run through when the machine is ready to be put away in the shed until the next spraying is required. There may be instances where it would be advisable to remove the valves and valve seats for cleaning, and also to clean the pump castings. If worn, the valve seats should be replaced or otherwise corrected. Many times they can be greatly improved by smoothing with emery paper.

The pump should be painted whenever the least rust or corrosion appears. It should be carefully cleaned, of course, before the paint is applied.

REGULATOR.

A regulator should be always in working condition. One frequently finds a grower spraying when the regulator is not working because of rust or rubbish in the valves. If it has become useless from rust, it should be taken apart and these parts smoothed with emery paper, oiled and reassembled. If it does not work because of rubbish, take off the valve clamp, or holder and remove the obstruction. Do not take a hammer and beat it to make it work. We have seen regulator castings broken in this way. If the treatment recommended for the pump is given, little additional care need be given the regulator.

CUT-OFFS, NOZZLES AND DISCS.

In many instances cut-offs are corroded by the spray solutions, and consequently do not work at all, or can be moved only with difficulty. Frequent oilings or greasing with cup grease will prevent nearly all of this kind of trouble. When a cut-off leaks or does not completely cut off the spray, it can be smoothed with emery paper so that a water-tight connection is obtained.

Nozzles should be cleaned when the spraying season is over. Both cut-offs

and nozzles should be put into a can of oil until they are to be used again. No special care need be given the discs, since they should be changed frequently. If the hole becomes too large and the cone of spray irregular, the old discs should be discarded and replaced with new ones.

HOSE.

Hose deteriorates rapidly in this hot climate, even if not used. Spray hose should always be washed out with a clean water when the spraying is over, and then placed in a barrel or other vessel to soak the outside for a couple of hours to half a day. After this, hang up so that the outside may become dry. They should be kept in as cool a place as practicable. At any rate, do not keep them near the roof of a building where it is exceedingly hot. When spraying, the kinks should never be pulled out, which will destroy the structure of the hose. Instead, the hose should be untwisted to remove the kinks.

RODS.

The bamboo rods are easily broken unless properly cared for. They must not be used to knock the oranges out of the trees nor as a whip. If they become broken at the end a tinsmith can repair them quite effectively. If the bamboo splits, wrapping with cord will make them about as good as new. The gas pipe rods should be kept straight.

ENGINE.

The same care should be given the spray engine as is given any stationary engine. Good cylinder oil should be used. It is poor economy to use in the cylinders oil designed for other purposes. The water should be drained from the jacket a few minutes after the last load of spray has been applied, so that the heat will dry the interior completely to prevent rusting.

CONCLUSIONS.

As a general proposition, the spraying machine should receive the same care as is recommended for any piece of machinery. It should be treated as if the owner really liked to see it in the grove, and not as if he had a feeling of dislike towards it. There is no reason why a standard spraying machine should not last twice as long as they do now.

Bureau of Entomology, Orlando, Fla.

The Treatment of Cloth to Prevent Mildew

A. W. Morrill and W. W. Yothers.

The deterioration by mildew of all forms of cloth exposed to the rains and dews is a great national waste. Tents, tarpaulins, awnings and fumigation tents are frequently seen in a state of either partial or complete destruction caused by mildew. This is especially true in the South where the climate is humid and copious rains fall during the summer when it is most conducive to the development of all forms of fungi. In fact, in Florida, where the experiments were conducted, the authors have noticed an extensive development of mildew in less than two days' exposure to the rains of summer. In the course of three or four weeks, if the mildew is not checked, or prevented, the cloth becomes greatly weakened and practically worthless. Under such conditions, mildew proofing becomes practically a necessity. Even in more arid climates, periods of wet weather may occur and mildew will develop very rapidly and will do much damage if unchecked or unprevented.

EXPERIMENTS IN MILDEW PROOFING.

The authors conducted experiments in mildew proofing canvas during the summer and fall of 1908. Thirteen solutions were tested with satisfactory results in several instances. The compositions and approximate cost of the various solutions on the basis of 300 gallons of water in each case are shown in the table on page 82.

The formula of solution No. 1 was obtained from an awning company. This is said to have been used extensively by this company, but is now superseded by a proprietary mixture which they offer for sale, and which was tested as Solution No. 7.

The formula of Solution No. 2 was obtained from several sources independently. It has been thoroughly tested in Florida in connection with cloth covers of vegetable sheds. Solutions Numbers 3, 4, 5 and 6 had not been tested previously, as far as known, and their use was entirely experimental. No. 7, as stated, is a proprietary mixture. Numbers 8 to 13 inclusive were tested to determine the value of the individual ingredients used in Solutions 1 to 6, inclusive.

The efficiency of the various solutions in preventing deterioration of canvas was determined by the strength of the threads in the treated pieces. Tests were made in three series. In Series 1, seven pieces of good quality of 8-ounce duck, each piece consisting of about two square feet of the fabric, were numbered consecu-

TABLE I.

Solutions tested in mildew proofing experiments.

Solution No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Alum (lbs.)	100	-----	100	-----	-----	-----	-----	100	-----	-----	-----	-----	-----
Copper Sulfate	-----	-----	50	-----	7½	7½	-----	-----	7½	-----	-----	-----	-----
Sal Soda	-----	7½	-----	-----	7½	7½	-----	-----	-----	7½	-----	-----	-----
Tartaric Acid, (oz.)	-----	15	-----	-----	-----	15	-----	-----	-----	-----	15	-----	-----
Zinc Sulfate (lbs.)	-----	7½	-----	10	-----	-----	-----	-----	-----	-----	-----	7½	-----
Sugar of Lead	-----	-----	-----	80	-----	-----	-----	-----	-----	-----	-----	-----	80
White Arsenic (oz.)	80	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Approximate (a) cost 300 gal.	$26.12	$ 1.90	$17.50	$17.00	$ 1.50	$ 2.50	-----	$10.00	$ 1.13	$ 0.38	$ 1.00	$ 0.75	$16.00

(a) These prices have not been brought up to date and do not represent the cost of the chemicals at the present high prices. They are nearer the average, however, than those that prevail at the present time.

tively from 1 to 7, and were soaked for 24 hours in the solution indicated in each case. The strength tests of the threads were made before treatment, after soaking for 24 hours and drying, and at the expiration of a period of thirty days, during which the pieces were flat on the ground, exposed to rain and dews. The period of exposure lasted from August 11 to September 11.

In Series 2, pieces of a superior quality of drill were lettered from A to G to correspond with the numbers on the duck in Series No. 1. These pieces were treated similar to the pieces in Series 1, except they were exposed, beginning August 11, for a period of 75 days, suspended on galvanized wire.

In Series 3, pieces of duck numbered from 8 to 13, inclusive, were treated with the corresponding solutions, and were tested and exposed the same as Series No. 1, for a period of 30 days, beginning September 17. In the case of Series 1, it rained on 17 of the 30 days' exposure, a total precipitation of 9.4 inches; in the case of Series 2, it rained on 34 of the 75 days, a total precipitation of 18.5 inches; and in the case of Series 3, it rained 17 of the 30 days, the precipitation amounting to 8.7 inches.

The pieces of duck and drill used in the three series of tests were in each case taken from a single large piece. After a number of preliminary tests of the strength of the threads, it was concluded by the authors that fifteen threads, tested in three groups of five threads each, gave sufficiently accurate results, and all the records given herein are based on such tests.

Five threads running crosswise of the cloth were placed together without twisting, and a loop was tied at each end of this skein. The distance between the loops was six inches in each case. The testing apparatus used consisted of a ring stand, with a ring and hook, to which one end of the skein was attached. To the lower end of the skein a light wire basket was hooked. The supporting strength of each skein of five threads was tested by placing a series of weights in the basket until the skein broke. A sample of each of the three fabrics used in Series 1, 2 and 3 respectively was tested before treatment to obtain a standard. For checks, an untreated piece of fabric was exposed to the weather in exactly the same manner as were the treated pieces in each series.

The results obtained in the three series of tests are summarized in the tables on page 76.

Series 1 shows a remarkable uniformity in the effect of Solutions Nos. 2 to 6, inclusive, in preserving the fabric. The conditions of exposure which have been described were most severe. In ripping the cloth to obtain threads for testing, it was noted that the piece treated with Solution No. 1 did not tear normally, showing a marked deterioration in strength. Cloths treated in Solutions Nos. 2 to 7, inclusive, ripped normally while the check was so much weakened by the exposure to the weather that it was impossible to ob-

TABLE II.

Series 1—Mildew-proofing experiments; average lifting strength of threads before treatment, 19 oz.

Solution Tested.	Average lifting strength of threads after 30 days' exposure.	Percentage increase or decrease in strength as compared with untreated and unexposed canvas.		Ratio of strength after exposure to strength of untreated and unexposed check.	Approximate rank of solutions in efficiency.
	Ounces.	Increase.	Decrease.		
1	14 1-5	----------	25.2	2.1 : 1	6
2	22 3-5	18.9	----------	3.3 : 1	4
3	23	21.1	----------	3.4 : 1	3
4	22 2-5	18.4	----------	3.3 : 1	5
5	23	21.1	----------	3.4 : 1	3
6	24 4-5	29.4	----------	3.6 : 1	1
7	20 4-5	22.1	----------	3.2 : 1	2
Check ---------	6 1-5	----------	64.2	---------	---------

TABLE III.

Series 2—Mildew-proofing experiments; average lifting strength of thread before treatment, 21 3-5 oz.

Solution Tested.	Average lifting strength of thread after 30 days' exposure	Percentage increase or decrease in strength as compared with untreated and unexposed canvas.		Ratio of strength after exposure to strength of untreated and exposed check.	Approximate rank of solutions in efficiency.
	Ounces.	Increase.	Decrease.		
1	19 4-5	----------	7.4	1.3 : 1	1
2	16 3-5	----------	22.5	1.1 : 1	4
3	15 2-5	----------	28.8	1.0 : 1	6
4	17 3-5	----------	18.2	1.1 : 1	3
5	18 2-5	----------	14.5	1.2 : 1	2
6	16	----------	26.0	1.0 : 1	5
Check ---------	15 1-5	----------	29.3	---------	---------

TABLE IV.

Series 3—Mildew-proofing experiments; average lifting strength of threads before treatment, 24 oz.

Solution Tested.	Average lifting strength of thread after 30 days' exposure.	Percentage increase or decrease in strength as compared with untreated and unexposed drill.		Ratio of strength after exposure to strength of untreated and exposed check.	Approximate rank of solutions in efficiency.
	Ounces.	Increase.	Decrease.		
8	24 1-5	.5	----------	1.0 : 1	2
9	18 4-5	----------	21.8	.8 : 1	5
10	22 1-5	----------	7.5	.9 : 1	4
11	16 3-5	----------	30.8	.7 : 1	6
12	22 2-5	----------	6.6	.9 : 1	3
13	25	4.1	----------	1.1 : 1	1
Check ---------	15 3-5	----------	35.0	.6 : 1	---------

tain 15 threads for testing, only 10 being used in this case. The check was badly discolored by mildew, while all the treated pieces remained absolutely free from mildew, as far as could be determined.

Series 2 is of considerable practical value, since the nature of the exposure to the weather conditions is comparable to the exposure of cloths and ducks in ordinary uses. The pieces of drill were exposed to direct sunlight and dried out rapidly after being wet with dew or rain, and even on the untreated piece the development of mildew was greatly retarded by the method of exposure.

In Series No. 3, it is shown that either sugar of lead or alum act as good preservers of canvas. Sal soda and zinc sulfate are somewhat less effective in the strength of solution used. Copper sulfate, as used, had little effectiveness by itself, while tartaric acid, used by itself in the amount used in Solutions Nos. 2 and 6, had no effect in preventing deterioration. It seems possible that by doubling the strength of the solution of zinc sulfate or of sal soda, either of these two would have given results as good as the sugar of lead or the alum.

Cost and efficiency considered, the use of either Solutions 2, 5 or 6 is advised. Since 300 gallons of solution is sufficient for a large quantity of cloth, the cost for treatment is slight. The expense of labor should be small if the work is well planned.

METHOD OF HANDLING LARGE PIECES OF DUCK IN MILDEW PROOFING.

Various methods of treating large pieces of duck with mildew proofing solutions have been tried by the authors. The method here illustrated was found to be the most satisfactory. Each piece was first laid out flat on the grass plot and folded fanwise to make a long strip 3½ feet in width. The piece was then wound onto the windlass and unwound into the dipping tank, being arranged fanwise back and forth across the tank so as to lie as compactly as possible. One or more pieces can be treated at one time, according to the size of the tank.

The tank used measured 5 feet 9 inches in length, 4 feet 2 inches in width and 2 feet 1 inch in depth, holding about 370 gallons. The tank was strongly constructed and made water-tight by filling the cracks with oakum and white lead, after which the entire tank was painted, inside and out. The tank was sufficiently large to treat one 80-foot octagon piece, or two 40-foot pieces.

Great care must be taken to fold the pieces of duck properly. If properly folded, the solution will not have to penetrate farther between the folds than the distance across the tank, but an improper fold may make it necessary for the solution to penetrate twice this distance. It is important in unrolling the folded piece into the solution that the canvas be carefully arranged, opening up the folds to allow the solution to penetrate as thoroughly as possible and pressing out the air. After soaking for 24 hours, the canvas is rolled slowly onto the windlass, allowing time for drainage back into the tank. From the windlass the wet duck is unrolled onto a wagon or cart and drawn to the grass plot, where it is to be spread out and dried. Wet duck should not be drawn over the ground, and thus unnecessarily soiled.

Bureau of Entomology, Orlando, Fla.

Scaly Bark, a Disease of Citrus Trees

C. D. Kime.

Scaly bark is a fungus disease of citrus trees occurring on the smaller limbs and on the twigs, leaves and fruit. While it has been reported on nearly all varieties, some show a remarkable degree of resistance. Of the varieties of economic importance, the sweet orange is the most susceptible, while the grapefruit and tangerine seem practically immune.

As can be seen from the specimens, the disease has a characteristic circular to more or less irregular outline. In mature spots the general appearance is very rough, with a raised center and a chestnut brown appearance, which once identified will not be easily confused. When these spots become sufficiently numerous, a scaling up of the bark occurs. This characteristic has led to its confusion with Gummosis and Psorosis, two very common and also injurious diseases.

The effects of the organism *Cladosporium herbarum* var. *citricolum* has been described in some detail, because of the fact that only certain well defined areas in the State are known to show infection. Therefore, large sections of the State are unfamiliar with the economic importance of the disease.

Scaly bark outbreaks have been reported from eleven counties, representing many prominent citrus sections of the State. The distribution of this disease is of unusual interest, because of the quarantine regulations against the movement of nursery stock from infected to non-infected territory. The Florida Plant Act, as now amended, permits the movement of stock within quarantine areas or from one of these areas to another. There are scaly bark infected areas in the following counties:

Brevard County, on the East Coast, comprises possibly the largest single area of infection. Many of the prominent growers along the coast make the assertion that no grove there is entirely free from the disease, and they continue with the statement that they have never worried about it because it causes practically no loss.

An inquiry into the situation does reveal many conflicting situations, and also the fact that we are dealing with a very peculiar disease. Scaly bark is well distributed throughout this quarantine area. Nearly every community has its scaly bark grove, with various amounts of infection. The section from Sharps to Cocoa, a distance of eight miles, is nearly solid with groves. Over practically the whole distance the land is unusually high hammock land. Probably one-half of these grove properties have shown infec-

tions of varying severity at different times. An investigation of many of these properties would easily lead to the conclusion that in its initial stages scaly bark is very slow in spreading. In all of these cases investigated, the disease was found to be restricted to a few trees in some portion of the grove. The trees, in some cases have been affected for years. There seems to be little tendency for the disease to spread to neighboring trees. Yet at times outbreaks have been found in other parts of the grove. Whether the disease was brought in from some outside source or was distributed from the infected point is a question not yet decided.

Other peculiarities of the disease have also been noted. In the Brown-Jones grove, a property of about fifty acres, three years ago about four trees were found affected with scaly bark. A year later this number had increased to nearly forty. Yet a short time ago no scaly bark could be found on any of the formerly affected trees. While these trees had some pruning, it was not done with sufficient care to explain the situation. This grove is located on high hammock land, and has just passed through two unusually dry seasons.

In the Mohawk grove the disease was first noticed on a tree somewhat near the center of the grove. It has since spread to other trees in the immediate vicinity; but at the time of my last visit, only one tree was found showing any markings. The disease was easily controlled by pruning.

In the Spafford grove, the same situation was present, but, as it was not pruned sufficiently, the disease spread more widely and a larger number of trees are affected.

On the Cocoa ridge, and in two groves on Merritt's Island, the disease appears to be easily controlled by pruning and by keeping up the vitality of the trees. The fungus shows only spasmodic attempts at spreading or becoming a serious factor.

At Indianola, on Merritt's Island, a case was noted where the disease had remained in three affected trees for about four years, and had shown no tendency to spread. In another part of this same grove, repeated prunings have failed to check the disease. It continues to spread, and causes some loss of bearing wood every year. This grove, the property of Mr. Reed, is well cared for and well pruned. The trees are about nine years of age. Three years ago one tree proved to be so badly affected that it was cut back to five-foot stumps. It is now in good bearing condition, and has only recently shown a return of the trouble. Carbolineum has been used where practicable, and with success. Another tree in this property was cut back and rebudded to grapefruit four years ago. Some of the orange sprouts, now present, show the disease, but the grapefruit is free and in excellent condition.

Four years ago the grove of Mr. Andrix, also of Indianola, was so badly affected that four rows adjacent to a neglected property on the north were cut back and rebudded to grapefruit. These trees are now in excellent condition. By severe pruning the disease has been controlled in the rest of the grove. The

rebudded portion of the property is on a lower part of the hammock land, where the disease was noticed first eight or nine years ago. Four years later the trees mentioned as being rebudded were so severely affected that drastic measures were necessary. Mr. Andrix does not live on the place, and at that time had no caretaker. The old grove on the north of the Andrix property showed scaly bark on everything from limbs four inches in diameter to leaves. The dead wood of several years' standing carried the old scars, telling more plainly than words the fate of neglected properties, and emphasizing by the parallel across the fence the urgent need for more adequate protection.

In only one property investigated was the claim made of benefit from spraying. This grove, at Georgianna, was so badly affected at one time that it was used to illustrate the difference between canker and scaly bark in the training of canker inspectors. Whether the results accomplished are to be attributed to the ammoniacal spray, or to care, fertilizer and much pruning, or to all together, it is certain that this property is remarkably clean at the present time. Gummosis is much more in evidence here than is scaly bark. The type of soil is high, sandy scrub, with yellow sand subsoil.

The last property investigated, and the one from which the specimens were taken, was immeasurably the worst. At the same time, it is most interesting from the standpoint of infection and historic interest. It is what is known as the Peter Whitfield place, and it, years ago, shipped the grade of fruit that made the Indian River orange famous. As late as the season of 1915-16, one hundred and fifty boxes of good fruit were picked from about eighty trees. At that time scaly bark was present, but not bad. A visit to this place today shows scaly bark on practically every tree. The trees are affected from the ground to their topmost branches. Marked leaves are numerous.

Several sour orange trees were examined for markings, but without success. This speaks well for the high resistance of this species. The grove lies on a rather steep slope towards Indian River. The back portion of the grove is on high sandy land. This portion is in bad shape, but is remarkably free from scaly bark.

The statement has been made that scaly bark does not attack nursery trees. While such attacks may be rare, they have occurred repeatedly. Scaly bark was found in a rough lemon nursery near Frostproof. The seed bed was isolated. No groves in that section were known to be infected, yet the attack was severe. No one had worked in this grove who had also worked in scaly bark territory. No buds had ever been used in the nursery. It was a seed bed only. Upon investigating the question of where the seeds came from, it was found that they had been secured from three different points, and, further, that each of these points was infected with scaly bark. The seed had been shipped in the fruit, and it is to be presumed that the peel had been carelessly thrown around. Another case of seedlings becoming infected is reported from Safety Harbor, and still another from the nursery of W. T. McCullough at Mims.

We are, therefore, forced to the conclusion that the disease can be transmitted on the fruit, and that seedling nursery stock can become infected.

From the observations made and the evidence so far obtained, it appears that scaly bark is very slow in spreading in certain locations and at certain times, but rapid in other locations or at other times. The disease is capable of killing and does kill good-sized limbs if it is unchecked. It seems to be more active in low hammock groves and on the inside of the tree and on the more upright growing limbs. Sprays, whitewashes, pastes or liquids have proven insufficient, or more injurious than helpful in controlling the disease. Severe losses of bearing wood and of fruit have occurred. Severe cutting back, careful and constant pruning, fertilizing and general care have given the best results.

More investigation is necessary to establish: (a) the actual amount of loss that can occur and that is occasioned to the trees and to the fruit by the disease; (b) the method by which the disease is disseminated; (c) the influence of soil and location on the severity of the attacks.

Titusville, Fla.

Discussion.

Mr. Skinner: I live in the midst of a scaly bark territory. In regard to the transmission of this disease, an instance which came under my observation may be of interest. In one of our groves, scaly bark was quite prevalent in a seedling grove, and had also started on the budded grove. The foreman had another grove about eight miles away. He went to work this grove, and carried a few oranges along with him to eat that came from a scaly bark tree. He told me two or three years afterwards that right where he peeled and ate those oranges a severe outbreak of scaly bark occurred.

I think every one of the groves I own or control has scaly bark, or has had it. We think that spraying the ground with Bordeaux mixture or ammoniacal solution of copper carbonate is a good plan. Bordeaux has had the most marked effect. We spray the ground under the trees every year in the section of the grove where the fruit has been affected.

I know the experts will smile at this idea of spraying the ground, but I think that the spores may propagate in the soil, or may be on the prunings that drop there. We have had very little loss from scaly bark since we have done this.

I am frequently asked to look at groves for people who desire to purchase them. Not long ago I was asked to look over a grove for a purchaser, and I looked at it. It was just about eaten up with scaly bark, but we could not find a bit of fruit that showed damage from the disease. I felt sure there must have been a lot of the fruit affected, and finally we found it. Wagon load after wagon load of scaly bark fruit was hidden out in the palmettos.

Mr. ——: Groves near Frostproof had a severe infection of scaly bark, and under the direct supervision of the Plant Board representative, every vestige of it was burned out by fire. The result was that none has been found since. The quarantine has long since been lifted. The growers in all parts of the State should assist and co-operate with the Plant Board. They know more about it than we do.

The Black Fly

Wilmon Newell.

It is not with pleasure that we call attention to a serious menace to any agricultural or horticultural product of our State. It would seem that we have had troubles sufficient with Citrus Canker and doubtless most citrus growers are congratulating themselves that the menace is apparently over and that the industry will henceforth be free from danger of destruction by new insects or diseases.

While the task of eradicating Citrus Canker has perhaps not progressed as rapidly as the public expected, those familiar with the magnitude of this undertaking, and with the difficulties which had to be overcome, feel that the battle has been steadily a winning one and that *with sufficient co-operation* and the absence of any further complicating circumstances the disease will be practically eradicated within the next 18 to 24 months.

However, at this point we would call your attention to the fact that, had you had an efficient Plant Board antedating the time of the introduction of Citrus Canker into Florida, say beginning in 1911, you would have had no Canker to fight and the cost of keeping it out would have been only a small per cent of the million dollars (approximately) which has been expended in the eradication work thus far.

Had there been a Plant Board in existence prior to 1911, you would naturally have expected the Board to have informed itself of this danger and to have given you warning. So now, you have a right to expect the Board to keep itself informed as to impending or imminent dangers and, if not able to completely protect you, to at least warn you of the danger in order that you may assist in your own protection.

Such a menace now threatens us. It is an insect known to the authorities at Washington as the "Spiny Citrus White Fly;" to the fruit growers of The Bahamas as the "Blue Fly;" in Jamaica as the "Black Fly;" and to the Cubans as the "Mosca Prieta." The term "Black Fly" seems best to fit the insect, hence we will hereafter refer to it by that name. It belongs to the same family as our common white fly but the adult, instead of being white, is a deep blue gray in color; in fact, is to all appearances black. The larvae and pupae are jet black. Like all members of the Aleurodid family, the larvae secrete honey dew in abundance and infestation is always accompanied by heavy deposits of sooty mold. Imagine if you will, a lime tree, the under surface of every leaf covered with thousands of jet-black insects and the upper surface cov-

ered with a layer of black sooty mold, so thick that you can peel it off as you would a sheet of paper, and you can well imagine why this insect is called the Black Fly.

The Black Fly is primarily an insect enemy of citrus; limes, lemons and grapefruit being heavily infested. Other citrus, however, experiences severe injury. The mango is also a favorite food plant. Among the other plants attacked may be mentioned the avocado, guava, pomegranate, Spanish lime, sapodilla, mamee apple, coffee, sour sop, papaya, sugar apple, jasmine, traveler's palm, plantain, hibiscus, acalypha, maypop, cherimoya, begonia and sweet bay.

Our first information of this pest came in the early part of 1916 when persistent rumors concerning the occurrence of Citrus Canker in The Bahamas resulted in the Plant Board sending Dr. J. H. Montgomery, of its inspection staff, to Nassau to investigate. Dr. Montgomery found no Canker in The Bahamas, but he did find the Black Fly in abundance on the Island of New Providence and that the destruction caused by it had been responsible for the rumors referred to. Though first noticed only twenty months before Dr. Montgomery's visit to Nassau, many citrus trees had died from its attacks and many others had been cut down by the owners after complete failure had followed their attempts to control the pest by spraying. Infestation by the Black Fly is invariably accompanied by rapidly increasing scale infestation so that the life of an infested tree is necessarily short.

I may add that, following Dr. Montgomery's return to Florida, we furnished Sir William Allardyce, Governor of the Bahamas, with numerous cultures of our white fly fungi which His Excellency introduced in the infested groves at different seasons. No indications were had of its attacking the Black Fly. We also furnished the Governor with the various formulae used in Florida for controlling white flies and scales, such as the miscible oil sprays, Yothers' formulae, etc. These were used but without any satisfactory results.

At about the time Dr. Montgomery visited Nassau we learned, through Prof. A. L. Quaintance of the Bureau of Entomology, that the insect is of common occurrence in India and that it was known to occur in Jamaica. This led us, on May 24, 1916, to address a letter of inquiry to Prof. John R. Johnston, President of the Comision de Sanidad Vegetal at Havana, asking whether the insect occurred in Cuba. His reply, dated May 31, 1916, stated that the insect was first heard of in Cuba when the entomologist of the Commission, in August, 1915, received a few specimens from citrus trees in a dooryard near Guantanamo at the eastern end of the island; also that on a citrus survey made by the entomologist and himself in 1916 the infested area covered a radius of about two miles, citrus, coffee, mango and guava being affected. Prof. Johnston further stated that the government was making plans to restrict its spread and to eradicate it.

I may say here that the Cuban Government, under Prof. Johnston's direction, did make attempts to eradicate the pest at Guantanamo and it was hoped for awhile that the attempt would be successful. However, a revolution in the eastern end

of the island caused a complete cessation of the work for several months. We know little of the Guantanamo situation today, except that the pest has continued to spread, that the coffee industry is seriously endangered and the infestation is probably beyond the possibility of control.

In December, 1916, Prof. Johnston reported to us that the Black Fly had been found in the Vedado, a residential suburb of Havana. Prompt steps were taken by the Comision de Sanidad Vegetal to control the outbreak and infested trees and plants were periodically sprayed with kerosene emulsion.

By the spring of 1917 the Black Fly had infested other suburbs of Havana and had been discovered at Hoyo Colorado, a point about 60 miles southwest of Havana. So serious did the situation appear that the Plant Board at its meeting on June 9, 1917, instructed the writer to proceed to Cuba and investigate the situation. Owing to the delay in securing a passport this trip could not be made until October, 1917. Arriving in Havana on the night of October 22nd I was fortunate to meet Mr. Harold Morrison, foreign explorer of our Federal Horticultural Board. Mr. Morrison had just returned from Jamaica and the Canal Zone. From him I learned that the Black Fly had been known in Jamaica for some 7 or 8 years and that he had recently found it at both ends of the Panama Canal Zone, namely at Colon, Christobal, Ancon and Balboa Heights.

During my stay of a week in Cuba I was accorded every courtesy and assistance by the Hon. Secretary of Agriculture, Dr. Eugenia Agramonte, and by Prof. John R. Johnston, now Chief of the Office of Plant Sanitation of the Department of Agriculture.

The conditions I found in Havana would strike terror to any Florida fruit grower. The Black Fly had spread to every portion of Havana and its suburbs, with the exception of a few business blocks on the Prado. Everywhere, on lime and mango trees, one saw the Black Fly eggs, larvae and pupae in abundance. Continued spraying with kerosene emulsion had not resulted in even a temporary control of the pest and its spread was steadily continuing. It may be said, however, that the labor and equipment used in the spraying work was not conducive to an efficiency which would meet with the full approval of a Florida horticulturist.

HOW THE FLY COULD REACH FLORIDA.

The pest apparently first came to Jamaica from India, perhaps on plants shipped to the Botanical Gardens at Kingston. From this point it apparently went to The Bahamas and to Guantanamo. It came to Havana either from Guantanamo or Jamaica and probably from the latter found its way to the Canal Zone. The point I wish to impress upon you is this, that within 7 or 8 years this pest has found its way from India to the western hemisphere and has established itself literally all around us. Also that it has followed all of the principal commercial lines of intercourse in the West Indies. Havana is but eight hours by boat from Key West. Can we believe for an instant that after the record it has

made as a traveler it will fail to make this short jump of less than a day's travel.

The transportation of infested plants to Florida would establish the pest at once. We are importing no plants from Cuba now. Our port inspector at Key West, Mr. E. L. Gehry, has already taken infested plants from passengers arriving there from Havana.

The adult flies live for several days. There can be no doubt as to the possibility of flies entering freight cars in Cuba and being transported via the car ferry to Key West. Cars from Cuba, several dozens of them, reach Key West from Havana every day and then they travel the entire length of Florida, from Key West to Jacksonville.

Passengers from Cuba and the West Indies will insist upon bringing bouquets and plants back to the United States with them and they resort to innumerable ingenious devices to get them past our inspectors at Key West and Port Tampa. Schooners and fishing vessels from Cuba land at various places along the Florida coast, often at points where there is no customs official or plant quarantine inspector. There is nothing to prevent vessels bringing infested material.

Eggs of the Black Fly are found upon the fruit of infested trees and though there is no evidence that the insect can live upon fruit after hatching from the egg, there remains the possibility of eggs being transmitted on fruit and, after hatching, of the larvae finding their way onto a host plant..

WHAT THE PLANT BOARD HAS DONE.

The Board has prohibited the importation of all plants and parts of plants; fruit, vegetables and manufactured articles alone excepted, from all islands and countries where the Black Fly is known to occur. It has also declared the Black Fly to be a "public nuisance" and has provided, in the various sections of its Rule 26 (Plant Board Circular No. 26, issued November 20, 1917) for the handling of any infestation which may be discovered in Florida.

Following the writer's return from Cuba in October, 1917, representations were made to the Cuban Government which resulted in renewed activity in attempting to control the pest in Cuba, the Board believing that the subjugation of the pest in Cuba offered the best possible means of protecting Florida against invasion. The Cuban Congress in November, 1917, at the direct request of President Menocal, appropriated $50,000 for the fight against the Black Fly. Promises were given us of the immediate destruction of all infested plants and trees within a certain distance of all railway lines and yards and additional inspectors and laborers were employed on the work under Prof. Johnston's direction. The Cuban Government also requested our assistance in organizing the work somewhat after the plans used in Florida in connection with Citrus Canker eradication. Our general inspector, Mr. Frank Stirling, spent practically all of January in Cuba on this mission and in February we

sent two of our experienced men, Messrs. L. Russell Warner and H. D. Bollinger, to Cuba. They are there now, Mr. Warner for the purpose of organizing the nursery inspection work and Mr. Bollinger in charge of the field inspection and eradication of the Black Fly in infested premises.

Realizing the danger of the pest becoming established in Florida and particularly on the Florida Keys, where our lime industry would be immediately jeopardized, the Board at its December, 1917, meeting ordered that the Florida Keys be given a thorough inspection. Through the liberality and assistance of the Florida East Coast Railway a power houseboat with quarters for a crew of inspectors was fitted out and the inspection of the Keys commenced on January 15th of this year under the direction of District Inspector A. L. Swanson. This inspection, which was made for both Canker and Black Fly, was commenced at the northern end of the Keys and gradually carried towards Key West. The inspection of the Keys has now been completed without either Canker or Black Fly being found. It is to be remembered, however, that the danger of introduction still exists.

The foregoing summarizes, with the omission of some minor details, what the State Plant Board has done and is now doing and, under present war time conditions, about all that the Board *can* do. Since America entered the war we have lost 129 of our trained employees, most of whom entered the military service direct, and it is indeed a difficult task to continue the Canker eradication work and other protective measures here at home without taking up a campaign against an insect enemy in a foreign country.

WHAT THE GROWER CAN DO.

The avenues through which the Black Fly may reach Florida are so numerous that it can hardly be expected that any system of quarantine can keep it out permanently. If we add to this the consideration that the Plant Board is severely handicapped by loss of experienced men for military service and that this handicap will steadily grow during the period of the war I think we are sound in the conclusion that the Black Fly will soon establish itself in Florida. In any fight against an insect pest or disease the Plant Board is no more than half the fighting force. The horticulturists of the State constitute the other half, and very likely the most important half. Not only must the Board have their co-operation in all measures which it undertakes, but they must be ever on the alert to detect this pest and to report anything suspicious to the Board. Above all things else, the growers should adopt such practices as will reduce the opportunities for the pest to spread when it is introduced.

So long as we are able to maintain our nursery inspection work at its present efficiency and so long as the laws and rules regarding the certification and movement of nursery stock are complied with, there appears little danger of the Black Fly being disseminated on nursery stock. The larvae and pupae are so striking in appearance that there can be no excuse for

an inspector overlooking them, even when they are present in small numbers. When a Florida nursery *is* found infested with the Black Fly the action of the Board will be drastic and it will be quick. We also hope it will be effective. We are confronting, as you can readily see, a situation where strict compliance with the laws and rules regarding the movement of nursery stock may be the means of averting a calamity and it is clearly the duty of every patriotic horticulturist and citizen to do his full duty in seeing that these rules are complied with by all, private citizens as well as nurserymen.

In case the pest is introduced other methods of dissemination will assume relatively greater importance. Particularly will this be true of the movement of vehicles and persons from infested properties or areas to non-infested ones. Field equipment, such as picking baskets and bags, field boxes and workmen's clothing will be agencies just as effective and sure in spreading the Black Fly as they were in spreading the Citrus White Fly.

Most of those present are familiar with the sanitary measures which we have been advocating for packing house and grove owner as a precaution and safeguard against the spread of Citrus Canker and other diseases. These measures include the disinfection of field boxes, the disinfection as far as possible of all picking equipment between properties, the fencing of citrus properties and prohibition of trespassing and visiting in citrus groves. All of these measures constitute excellent insurance against the spread of any Black Fly infestation which may occur and I warn you now that this infestation must necessarily occur before it can be discovered and steps taken to abate it. Labor and other conditions are not going to be favorable to the grower in the months to come but, regardless of conditions and difficulties, the fact remains that the more these precautions are practiced by those interested in our fruit industries the more protection will we have against a danger which in the light of all available information, will be as big a menace as Citrus Canker itself.

State Plant Commissioner, Gainesville, Fla.

Discussion.

Mr. Newell: The eradication of Citrus Canker has been progressing, although not as rapidly as the general public expected it would. It is significant, too, that the campaign of eradicating the Canker in Florida is the only campaign of that character in the world that has ever succeeded. The same attempt has been made in other parts of the United States with reference to plant diseases, and not a single one of those undertaken has proven successful. If we finally stamp out the last vestige of that disease, the effect of what we accomplished will be of even greater value to the country than the saving of the citrus industry.

To illustrate; if we fail to eradicate Canker here, as other attempts to eradicate diseases have failed in other parts of the country, it will probably be a century before an attempt will be made again. As it is, there are now campaigns against other diseases, involving the employment

of hundreds and even thousands of men and running into the expenditure of millions of dollars, under way.

While it may be said that Citrus Canker is under control at the present time, that does not mean that the work is completed. We must get the last vestige out, and the last germ of it eradicated before we can say we have succeeded. That point must be reached within the next two or three years.

Mr. ——: Are there any natural enemies of the Black Fly?

Mr. Newell: None has been found so far. In connection with that, I might say that after Mr. Montgomery's return we sent to the Governor at Nassau, cultures of the fungi that attack the whitefly. The Governor reported that the fungi did not take hold of the Black Fly at all, and they did not get any results. We also sent to the Bahamas all of the spraying formulae that had proven effective against the whitefly in Florida, but these seemed to give no practical results. At the present time, there appears to be no enemy of this fly.

Mr. ——: Is the pest present in Porto Rico?

Mr. Newell: I do not know.

Mr. ——: What is the average life of the fly?

Mr. Newell: No very accurate statistics have been obtained. One of the men at the Experiment Station in Cuba made some experiments which indicated that forty-seven days was the life of each generation.

The Pruning of Citrus Trees

C. W. Smith.

I have been asked to give my experience in pruning citrus trees. Four years ago, the grove of which I am at present superintendent had quantities of dead wood in the trees. During that year we took out only the larger dead branches and hauled the dropped fruit from the grove. The dropping of the fruit was caused by stem end rot. There were wagon loads of it to remove.

The next year (1916) we were able to give the greater part of the grove a thorough pruning, but there was still considerable dropping of the fruit. This year (1917-18) we have had a very heavy crop of fruit, but there has been very little dropping. Most of that which dropped did not rot and has been shipped to market, bringing a good price.

It has been our observation that fruit rather severely affected with melanose does not hold well. If left unpicked until late in the season, there will be only a small percentage of it left hanging on the trees. A neighbor who did not believe in the effectiveness of pruning allowed his trees to go entirely unpruned during three or four seasons. He told me a short time ago that melanose was plentiful in his grove, and much of his fruit was dropping, and that he now attributed it to the presence of the dead wood in his trees. He is now pruning his grove.

Following the February freeze in 1917, we did not begin pruning until May 1st, for two reasons: First, we were unable to tell where to cut; and second, there was too much young growth present that might become infected from scratches made by removing the dead branches. When we began pruning, we adopted the motto, "If in doubt, cut it off."

At the end of the two years previous, we found that we had made the mistake of not cutting far enough back on the limbs; and that, I think, is a mistake that is often made. This year, there being so much dead wood in the trees on account of the freeze, we thought it best to go over the grove hastily, cutting out only the larger dead limbs. But, having several men at the work, we soon found this practice to be a waste of time, so we changed to doing the work thoroughly, cutting out all of the dead wood to the smallest twigs, making smooth cuts and painting the cut surfaces with carbolineum.

We think leaving the brush on the ground during a length of time will favor the production of melanose almost as much as leaving it in the trees. Conse-

quently we hauled the brush out close behind the pruning.

All trees which were dying back from natural causes, and which were in need of "buck-horning," were left to be pruned just before the new growth started.

The growth and fruit on trees that were pruned from May 1st to June 20th came through the season comparatively free of the melanose; but those pruned afterward showed more or less development of the disease.

On account of the large amount of dead wood present in the grove, and of labor conditions, we continued the pruning from May to November, but we do not consider it to be a good practice to remove the dead wood from the trees while the growth is young and tender. December and January are the best months for pruning on account of the dormant condition of the trees at that time.

As a whole, pruning seems expensive, but the cost per box of fruit on the tree is comparatively small. We had from four to ten men pruning from May to November of last year; the cost was only about 35 cents per tree for trees from twelve to twenty years of age and 15 cents per tree for the smaller trees.

If it costs 35 cents per tree to prune trees that will average five boxes each, and if by pruning, melanose is prevented to a large extent, the income from the increased amount of fancy fruit will easily pay the cost of pruning and give a neat profit besides.

Clearwater, Fla.

Bringing Back the Grove Injured by Cold

G. M. Wakelin.

There are groves in the State which the owners should discard rather than to continue to struggle with them as at present. If experience has shown that these properties are liable to receive damage from cold, they must be provided with some form of "fire insurance" before they will really pay.

Freezes and the resultant damage must be recognized as a factor in the growing of oranges, and provision should be made to meet them, just as provisions are made to control insects and diseases. Even then, one may get caught napping. Fruit was frozen and the trees more or less damaged in some considerable sections of the peninsula in 1894, 1895, 1899, 1905, 1909, 1917 and 1918. Besides, there have been local cold snaps in other years.

Back in 1895 some growers seized the opportunity to crown graft the common orange seedlings, which they had not had the nerve to cut back before, to chosen varieties. The grafts grew remarkably well and the operation paid handsomely. This is an excellent plan, and a good way to handle trees of a doubtful value. In such work it is well to remember, however, that there should be some kind of a balance maintained between the tops and roots. Trees heavily cut back may make such a heavy growth under the stimulus of the big root system that they will take dieback. Fertilizers, particularly those formulas rich in organic ammonia, should be used sparingly.

It was an object lesson to see the great difference between the groves pruned soon after the cold of last spring (1917) and those left until summer or fall. The trees in the latter started growth with the others, but shortly the new stems and leaves were red and drawn up with melanose; they never became thrifty, and the fruit, especially that borne inside the trees where it was exposed to the dripping from the dead wood, was the worst appearing stuff ever shipped out of Florida. Neither did the fruit carry well, being affected with stem end rot.

The pruned trees showed some melanose, but the bright, vigorous new growth was soon making good the loss of top. Thus the trees that were not pruned early really suffered a second injury from disease which was nearly as great as the original injury from the cold. So, by all means, prune out the dead and weakened wood as soon as the extent of injury can be determined.

Not only does the dead wood harbor the melanose fungus, but itself seems to be poisonous to the tree. Besides, it pro-

vides places for borers to start and work thence into the live wood.

Heavily injured branches will die yet further back and keep on dying if not pruned and painted. Carbolineum and thick paint (about half and half) will both disinfect and cover the wound. I would not spray with Bordeaux mixture or ammoniacal solution of copper carbonate to prevent melanose unless I wanted to fight about ten rounds with the purple scale. But if a spraying with lime sulphur of sufficient strength can be made, it would probably pay. It will pay best, however, to devote one's first attention to getting rid of the dead wood.

Trees that have lost much of their tops often sucker heavily and sprout all along their limbs. Such a growth is useful for a while, but should later be thinned out lest it choke up the tree. Trees cut back to the main forks will need to be reshaped after a few weeks, or they will grow up like pear trees.

Trees weakened in any manner, either by heavy bearing, diseases or insects, will suffer more from the cold. Again, trees injured by the cold seem particularly vulnerable to diseases and insects. A clean, healthy tree has unappreciated powers of resistance.

Tavares, Fla.

Protecting the Grove from Cold

A. M. Tilden.

I am in receipt of a letter from the other member of our committee which briefly reads as follows: "We believe in frost protection, and in the January cold snap fired our grove and saved everything, while another did not fire, and he also saved everything. The cold was spotted, and hurt a grove here and left unharmed one there. A paper under such conditions and experiences would be of but little value."

We did not fire our own grove. While the most of it came through in good shape, some hollows planted to old Triumph grapefruit trees collected and held the cold, and the trees were frozen to within a few feet of the ground. This same thing happened to some eight-year-old tangerine trees in another hollow.

A gentleman living a few miles from us did fire his grove for two nights, and has kindly given me the benefit of his experience to relay on to you. He is very confident that his work was beneficial and that his tangerines, at least, would have suffered had he not fired.

During the summer he hauled wood and placed it beneath each tree. As his trees are large and close, meeting overhead, the piles of wood were not in the way.

During the first night the wind was strong from the northwest, and when, at 11:30 p. m. the thermometer went to 28°, he lit the fires, one small one in every check. The thermometer soon went up to 33°. Double fires were then lighted on the northwest side. At 3:30 a. m. the thermometer went to 26° outside, but the fires were burning strongly, and the temperature inside was at 40°. It stayed there until sunup, when the danger for that night was over. At a point sixty yards to the leeward of the last fire the thermometer at no point went below 32°. This is interesting, as showing how the heat may be carried by the wind.

The second night was still and quiet, and when, at 12:30, the thermometer went to 28°, the fires were lighted in every other check. The temperature rose to 33°. At 1:30 the temperature outside dropped to 26°. The remaining fires were lighted, and soon the temperature rose to 40°. At the before mentioned point sixty yards to the leeward of the last fire the temperature rose to 30°. Apparently the heat did not travel as well without the wind as with it.

This firing extended over an area of nine acres. Forty cords of wood were burned in two nights, and three men easily kept the fires up. There was absolutely no frost damage, but it seems a fact that

in nearby groves the frost damage was slight, if any, where no firing took place.

In my opinion the value of this operation lies not so much in the fact that there was no frost damage in this grove, but that these wood fires raised and held the temperature ten degrees. If the thermometer had dropped as low as 22°, this grower would probably have saved his fruit.

Winter Haven, Fla.

DISCUSSION.

Mr. Skinner: There has always been the disposition on the part of those who do not fire to say that it does not pay to fire, and even this paper leaves something of that impression.

If a man lives in a district where it is going to freeze anyhow, it does not pay to fire; but a man who lives in a district where the temperature is apt to go a little below the danger point, there is no question in my mind but that it pays to fire. Absolutely no question.

A man who lives in a country where it is very cold will be frozen out, and there are many people who will be seriously damaged; but the man who fires will win out if he carries his grove along successfully otherwise.

I have harvested one piece of ground for six years, and this year it bore the largest crop of fruit I have ever seen. I attribute it to the fact that during the cold spell last February, the grove was fired. The trees are close together. It is one of the benefits of close planting, that you can protect your grove from cold damage much easier.

During February I fired about three hundred acres. Some of it got good care and some of it did not, but our fruit was saved. There was no damage to the fruit to speak of, and no damage to the trees except the young trees outside of the firing line. They were cut to the ground. Inside the firing line they were not hurt at all. Everybody in our country knows it pays to fire, and those who have been successful orange growers are the men who fire.

Mr. Brown: I certainly agree with Mr. Skinner that it pays to fire. Our particular grove is located in a spot where, as Mr. Skinner says, it would freeze anyhow. We had a very serious experience only eleven years ago, and one nine years ago. We have had just as severe cold snaps since, but we have fired and absolutely protected our grove of nearly two hundred acres.

To show the damage that came to us eleven years ago, our grove had reached the point where it was producing 25,000 boxes. We had about 25,000 boxes in the grove the year of the cold snap, and at the time of the freeze we had about 15,000 boxes on the trees. We lost practically all of them. We did pick some from the inside of the trees afterwards, but you may say it was a total loss.

The next year there was no freeze, and we got about 15,000 boxes. The following year the crop was estimated at 50,000 boxes; that was the second year after the freeze. We had already picked 25,000, and we lost the balance. As someone has

stated, you could not step on the ground in the section where we had not completed the picking without stepping on grapefruit.

The following year the crop was reduced to 6,500. We began to get busy right then. We have been hauling wood into our grove more or less ever since; not only wood, but batton dross; we bought hundreds of tons of that, placing it in holes in the ground. It is hard to get it now at any price, but we are still putting in wood. After the freeze two or three years ago, we put in 500 cords. This last winter we had to have fires two or three times. We would not try to continue in the grapefruit business without having our groves protected.

The Manatee Company has 200 acres covered with the oil pots. They put them in, probably, at the time when material was cheap; but today it is almost impossible to get either the pots or the oil at any price.

We are using wood—wood that is heavy and rich and fat. We use wood that is solid fat, when we can get it. We are paying $6 per cord for it this year, delivered at our grove. Last year we paid $5. The increased cost of stumpage and labor makes it necessary to pay more. We fire, and expect to continue to fire as long as we continue in the grapefruit business.

Mr. Skinner: My experience with oil might be interesting. I think the heat is all right, but it is an infernal nuisance. Some of the pots are bound to be tipped over, and the oil gets on the ground, and you have to have so much oil to keep the fires burning all night. My great difficulty has been to keep my men from starting their fires too early, so that when it comes to 6 or 7 or 8 o'clock in the morning, they may have some fuel left. I think it takes at least a ten-gallon oil pot, burning eight to nine hours, to furnish sufficient heat to do any good; and perhaps it will not burn that long. If there is a little water in the pot, when the oil reaches the boiling point, all of it goes up in a geyser.

The coming fuel is coke. In ordinary times you can get a fine coke that is not much larger than half an inch. It cannot be used in foundries. Put that in your grove, and in five or six years from now it will be there just the same.

Concerning the reserve supply of fuel, it is a great thing to know you have enough fuel. If you use wood, your labor is apt to throw on a whole lot of it, and in the morning, when the critical time comes, you don't have any left. It is very difficult to regulate the amount of fuel to put on the fire. Of course, if the men are trained, it is not so hard to keep them from putting the whole reserve supply on the fire at one time.

I think coke is very much better. It seems to throw the heat out sidewise. I understand Mr. Gillett used it this year and found it very satisfactory.

Mr. Brown: About the men putting on too much fuel. When they struggle with a stick of wood four feet long and as big around as their body, they are not going to put on too much at one time.

Many people are apt to waste fuel, as Mr. Skinner says. I do not think it necessary to start our men out until the ther-

mometer gets to 27°, and frequently the thermometer went to 25° before we started the work. A year ago the thermometer was at 26° at 9 o'clock at night. We had some 15,000 boxes of fruit on the trees at the time, and if we did nothing more than save the fruit, the firing more than paid for itself.

I suppose the temperature might go to 23° or 24°, but if you get your fires going and raise it to 28° or 30°, you will have saved everything. It is a very easy matter to waste several thousand dollars' worth of fuel by lighting your fires some hours before it is necessary.

One of the papers told about a man who saw the thermometer go to 28°, built his fires and raised the temperature to 40°. Now, as far as I am concerned, I would much rather keep the thermometer down to 28° or 30°. That is, while the trees are dormant. Of course, after the sap begins to rise, when the temperature gets down to somewhere about 33°, I think it is time to stop it there. You are apt to have trouble if it gets below freezing point, which is 32°.

Mr. Mead: I found a very good plan was to place a saucer of water in a certain place. As soon as the water begins to show slivers of ice, start your fire. Of course, if the trees have begun to bloom, you must begin to fire much earlier. I have found that at 32°, if the trees are dormant, there is no use to fire unless to save fruit.

Mr. Gillett: I am afraid I haven't much to say about coke. It seems to me that I have heard open confession is good for the soul. I never heard before that the thermometer went as low as 26° in Manatee County. (Laughter.) I trust that if there are any reporters for the Fort Myers papers here, they will be very indulgent in publishing that statement.

Mr. ——: They must be indulgent; they are in the same boat. (Laughter.)

Mr Gillett: Some years ago, I undertook to fire some groves, and had a similar experience to those who have been talking. They were old seedling groves with very large trees. My experience in those groves was that it was an easy matter to raise the temperature ten degrees. I had ten or twelve negroes located inside the grove, and they were usually located near a fire.

In firing groves, I found the critical time was about sunup in the morning. The wood was generally pretty low at that time, unless we had a reserve supply.

The time to begin to fire is when the thermometer has gone down to 26° or 27°. The temperature should be kept up until after sunup, or until the outside temperature has risen.

It is a problem to get a sufficient quantity of lightwood. If the timber stands, it rots out in a year or two, and there is nothing left of it.

We finally decided, after we got disgusted with oil, that coke might possibly be a better fuel. We have made some experiments with this fuel, having a container built that will hold a bushel of it. There is a constant glow, no smoke, no greasing of the fruit, and it gives much better results than anything we have tried. As Mr. Skinner has said, it is easily handled. You can carry it anywhere,

and it is indestructible. It does not matter if it is of but little weight; it burns just like coal in an engine. It burns well, regardless of water. If it is damp, it is not so easily ignited; but once it is started, it burns all right. In many cases it is cheaper than wood, easier to handle and can be depended upon. In the future, I think the solution of the heating problem in Florida will be coke. At the present time, the cost of coke, like that of wood, is very high.

Mr. ——: How many containers do you use to the acre?

Mr. Gillett: Where the trees are set twenty-five feet apart, one in each square; but it was not necessary to light them all unless it was very cold.

Mr. ——: How long will they burn?

Mr. Gillett: All night.

Mr. ——: Do you take the containers out of the grove during the summer season?

Mr. Gillett: No; we leave them right under the trees. They don't rust out badly.

Mr. ——: Do you have a cover made for the containers that can be slipped on to put the fire out?

Mr. Gillett: We have none. We let them burn until they burned out.

Mr. Brown: In firing a large acreage, it is surprising how few fires per acre will turn the trick. Our wood is placed at the rate of only twenty-five piles to the acre; that is, we have a pile of wood under every alternate tree in every alternate row. The trees are 25 feet apart and the rows are 15 feet apart. When we fire, we fire every alternate fire. We have an average of only 12½ fires to the acre.

Mr. ——: The average grower who has a small grove should take into consideration the tendency of air currents from the outside of the grove. Assume that the current of air is coming from the northwest. The fires on the outside rows should be doubly thick.

Of course, the size of the trees determines very much how many fires per acre should be maintained. If the trees are small and far apart, the fires must be closer together.

It has been well worked out that 6,000 gallons of artesian water at 70°, when liberated on the grove, will liberate as much heat as is released in the combustion of a ton of Alabama coal. It would seem that many growers are failing to utilize a cheap means for heating their groves.

Mr. Perry: There is one phase of this proposition that has not been considered, and that is the labor proposition. The big problem is lighting the fires. If you are contemplating firing a grove for real protection, it is no use to be prepared to use alternate fires at the rate of 25 per acre, because that never would have saved you in '94 and '95. In a case like that you must be prepared to use every fire. It is a pretty big job to light the fires that are necessary, even in a ten-acre grove. Suppose you light two fires per minute; that is a fire every thirty seconds. Keep that up on a cold night, and you have done a good day's work in thirty minutes. Just figure how many men you must have to get your fires lighted in time to prevent damage with a rapidly falling tempera-

ture. Take a grove of 800 or 1,000 acres; twenty or thirty men could not get those fires lighted all night.

Every man who has had experience at all in cold weather in Florida knows that when the cold comes, we have one night that is dangerous; the next night it is worse, and probably the next night it will be still worse. After a negro has been around one night and lighted sixty fires, he thinks he has done a good day's work. They may come for the first night, but the chances are they won't come the next night, and certainly not the third.

You can provide all the wood or anything else you want to, and make all other provisions, but if you cannot get the labor, or have not the labor ready, and have not systematized everything in such a way that you can light those fires when it is the proper time, your efforts will be worthless.

Mr. ——: There are many cases when a heavy rain will immediately precede a freeze. Coke is hard to fire up, wood is worse, and coal is very slow. In South Florida we have what is called the rosin dross of turpentine stills. If that is beat up very fine and placed on top of the wood, it is the solution of the problem, except when there has been a heavy rain. In that case the difficulty can be overcome by sending one man ahead with a can of oil. He pours a few spoonfuls of the oil on the wood, and the man firing needs only to throw a flame on it and go ahead. A little training will make the workers efficient. I have one man who has fired a grove for fifteen years. He takes care of a grove in one of the coldest spots in Florida.

Three men in a ten-acre grove in one of the coldest places in the State, and using, when necessary, twenty-five fires to the acre, have saved that grove for fifteen years.

Mr. Brown: I don't have a bit of trouble. I am surprised Mr. Perry has all this trouble. We get our fires in three-quarters of an hour from the time we start. My men have fires, 12½ to the acre, in thirty acres.

Mr. Perry: How many fires do your men light per minute?

Mr. Brown: Probably about four. About fifteen seconds to each fire. Of course, we are thoroughly equipped. We have a two-quart can made for the purpose, and we use a mixture of one-half gasoline and one-half kerosene. It has an asbestos wick and a snout. With one of these cans a man will make the round and use only about one-half a can full. We put a little batton dross on top of the pile of wood. Of course, the kerosene and gasoline will burn a little bit themselves. They set the batton dross to burning, and that in turn conveys the fire to the wood.

I keep my men on the job; we pay them well to be there and to depend on them. Most of them live on the place. We notify them when it is threatening, and warn them not to go off the place. Frequently after they come out they sit around the fire all night because it is not cold enough to fire up; but we pay them well just to be there.

Mr. Perry: Some time, when Mr. Brown gets time, I would like to have him figure the number of men he has stated and the number of fires in a two hundred-acre grove, and estimate the number of miles they must go in the time he has stated; and then I would like to enter the winner in the Marathon race. I have lighted 128 fires in an hour, and thought I had done about the hardest day's work I ever did.

Mr. ——: I think Mr. Perry is trying to start something. I would like to have Mr. Skinner tell us about overhead irrigation. What advantage, if any, has that over fire, and what is the probable cost?

Mr. Skinner: I don't think there would be any advantage over fire. Fire is what you want for heating.

In reference to the can Mr. Brown spoke of, there is one thing we should remember, and that is, there should be a gauze soldered between the can and the spout—a fine wire gauze to prevent the fire going down into the can of kerosene. Danger is there unless there is a gauze between them. With it there is no danger.

Mr. Mead: My method of preparing for the firing is to use a handful of fat splinters; then I would put two men in the firing squad, one to dash the oil on the wood and the other to follow with a torch and touch it to the splinters. I venture to say there is not one fire in a hundred that will not start almost instantaneously. I place the splinters where they are well protected from the weather. I always use kerosene and the fat splinters, and the fires can be lighted as fast as you can go. In twelve years, I have lost my fruit only one time.

Mr. ——: There are a great many things we think are so, and I want to make a suggestion. I believe that fires can do good. I have tried them enough to know they have done good. More times they have not done me any good. Mr. Brown is an efficient dynamo, and has his firing down to something he can do. I suggest this Society appoint a committee composed of men of experience, to condense their information in one report. In that way we can get the actual practical benefit that each man can give us. We should have a report from different localities.

Now, I have spent $200 firing, and the man next to me did not spend a cent, and yet saved his fruit just the same. There are many men here who have had the same experience, and I would like to get this information all together in one report.

Mr. ——: I think I know the particular gentleman referred to in Mr. Tilden's report who did not fire his grove. The fact of the matter is, that he has lost a good deal of fruit and a good deal of would mean the expense caused by firing everything.

Mr. ——: One point I would like to have made a number of tests along that the correct place for the thermometer. I have brought out, and that is concerning line, and would like to get the opinion of other gentlemen as to where it should be placed to decide when we shall begin to fire. There should be well defined regulations and locations. It is a problem to

obtain thermometers which will register the same. The thermometer we use to fire by is of great importance. It would lead to unnecessary expense if it really registered several degrees too low. It wood, while the man who did fire saved too soon.

I think the most important point Mr. Brown brought out was the proper temperature at which to start firing.

From my experience, I think a very necessary step is the standardization of the thermometers.

Mr. Brown: There is a lack of dependable thermometers. We have had serious trouble in depending upon a thermometer which we thought was all right when it was not. I have found it difficult to get a dependable thermometer at a reasonable price. I need about half a dozen myself, and I imagine every man in this Society needs one.

Mr. Hart: There is so much in this question, I would like to talk about it an hour or two. In that time I could not begin to cover the different points.

Now, about the location of the thermometer. A number of years ago, in Jacksonville, a committee was appointed to make a report on that very question. We made what I consider a very complete report. We studied the question very thoroughly. We took thermometers which had been tested by the Weather Bureau and tested the temperature at the same time at different elevations and when conditions were different; that is, when the cold was still and when the air was moving, etc. We found a difference of from 4° to 6° on still nights between locations six inches above the ground and five to six feet higher up, and still more difference at the next five feet. There was a difference of 6° or 7° between ten feet up and six inches above the ground, when the air was still. You will find several degrees difference wherever air is held in a pocket. The cold air sinks to the bottom, and it will be colder than further up. Bear that in mind in the location of your thermometer, always.

Where the grove is locked in timber, I think it will be colder in the middle of the grove and on the south side, than on the borders which are next to the timber. The timber protects the rows nearest to it. If you do not fire, you want to be sure that surrounding conditions are such that the air can move freely.

Now, about the degree to fire. There is no question but that a very large per cent of the fuel used in firing goes to waste because of firing too soon, and keeping the temperature too high. What is the use of raising the temperature about 30° or 32°? An orange is not in danger until the temperature gets down to about 26°. It will stand that for several hours, under certain conditions. It is unnecessary and wasteful to keep the temperature up. It is throwing heat into stellar space where it will do nobody any good. I have seen the thermometer go down to 24° when the trees were in full bloom, and even then I lost only about one-third of the bloom. I cannot explain that except by believing there was just a little haziness in the atmosphere which protected the frozen bloom and gave the sun a chance to thaw it out.

Mr. Hume: I think Mr. Sampson's suggestion with regard to having a committee appointed to work this information up into a condensed report is a good one. I shall ask the Secretary to get this up, to appear in the Quarterly which will come out in July or in October. I am not going to appoint any special committee, but if men like Mr. Hart, Mr. Skinner, Mr. Brown and others who have had valuable experience will tell us what they have learned, I know we will get what we are after.

The Market News Service of the Bureau of Markets, United States Department of Agriculture, in Florida

F. W. Read.

The unusual interest in the marketing of farm products of recent years has been largely due to the remarkable rise in prices since 1913-14. The rise in prices of food commodities has been greater than that of manufactured commodities. In the face of greatly increased costs it has become absolutely essential for the grower to realize all he can for his products. In order to be able to do this the Bureau of Markets feels that the grower is entitled to as much information concerning the condition of the markets of the country and on which he places his goods as is the buyer. This is the purpose of the market news service of the Department of Agriculture—to furnish you with this information—and the Government has organized a very large piece of machinery to carry out such a program.

So that you may definitely understand exactly what work we are pursuing in the State of Florida I will briefly describe the machinery of the market news service as it now exists, in the country at large.

We have paid trained representatives in practically every big city in the United States whose duty it is to collect each morning information concerning the prices at which the principal farm products, fruits and vegetables particularly, are moving in large lots. These representatives receive direct reports from all railroad lines coming into their cities telling them the arrivals of each commodity for the previous twenty-four hours. The reports are assembled by our men and telegraphed to Washington over a special leased wire. In Washington the reports are reviewed, assembled and quickly relayed to all of our market stations. In maintaining this service we have one of the largest private leased wires in the country, stretching from coast to coast, with a total mileage of about 15,000 miles and costing for maintenance about $300,000 a year. You can readily appreciate from these figures alone the demand for the market news work as conducted by this Bureau, for our extension of facilities has been gradually brought about solely through the increased demand on the part of the growers and shippers for the information we have to distribute.

In addition to representatives in practically every big city in the country we

also have trained market men located for short periods of time in the principal producing sections of the country to cover the individual deals for the benefit of the growers of the particular community or state in which they may be located. This work in Florida has become very important and widespread and as I will show you later, the Bureau of Markets, through this news service, is doing as much for the State of Florida as for any other state in the Union. All of our representatives issue a daily market news bulletin which shows the prices of the fruits and vegetables at shipping point and on the principal markets of the country, as well as certain other essential marketing information. We have the cooperation of practically every railroad in the United States in this work and they supply us with daily figures of the carlot movement over their lines as well as their destinations.

Last fall the Bureau opened a permanent, all-year-round office in Jacksonville under my general direction and the work in the State of Florida is supervised from that point. We have greatly extended the market news service for Florida growers during the past season.

When I tell you that up to April 1st, 1918, the Jacksonville office and the Florida field stations had issued over 400,000 bulletins to Florida growers you will appreciate the fact that Florida growers are getting at least their share of this big Government work.

We have issued bulletins on thirteen commodities including White Potatoes, Lettuce, Celery, Cabbage, Tomatoes, String Beans, Peppers, Oranges, Grapefruit, Tangerines and Strawberries, and have had personal representatives in practically all of your important producing areas. Upon the beginning of the Lettuce and Celery deals at Sanford about the middle of December we stationed a representative at that point who remained until the end of the first week in April and from that date on we have followed through the Lettuce, Celery, Tomato, Cabbage and Mixed Vegetable deals up to the opening of our last office at Hastings, Fla., on potatoes, April 15th. Following is the complete program for the State of Florida so far as the field work is concerned, during the season of 1917-18. See page 112.

One very recent and important addition to our market news work this past year which has been brought about by the demand on the part of the Florida growers, has been the service on Citrus fruits. A market news bulletin on Citrus fruit that would be of some information to growers and at the same time not advertise the particular brands of certain individuals was an exceedingly difficult proposition to work out. We had never before attempted a service of this kind but had confined our information to the other and more staple fruits and vegetables. Citrus fruit growers can appreciate the fact that it is much more difficult to report a market on such a commodity as oranges than on potatoes or cabbage or tomatoes. You have many sizes, grades, brands and so on to compete with and the introduction of our service on citrus fruit was preceded by an extended study and tour of investigation which I made through the State and by a discussion and conference

Station	Commodity	Opening Date	Closing Date
(1) Sanford, Fla.	Lettuce	Dec. 19	Mar. 13
(M. S. Wiggins)	Celery	Feb. 2	April 6
(F. M. Kern)			
(2) Palmetto, Fla.	Lettuce	Feb. 4	Mar. 9
(F. M. Kern)	Celery	Feb. 7	Mar. 30
(M. S. Wiggins)	Cabbage	Feb. 13	Mar. 30
(3) Miami, Fla.	Tomatoes	Mar. 11	May 15 (approx)
(A. E. Lindquist)	Cabbage	Mar. 15	May 15 (approx)
(4) Leesburg, Fla.	Cabbage	Mar. 11	May 1
(W. M. Stevens)			
(5) Hastings, Fla.	Potatoes	April 15	May 15 (?)
(M. S. Wiggins)			
(6) Palmetto, Fla.	Tomatoes	May 1	June 1
(F. M. Kern)	Mixed Vegetables		
(7) Ocala, Fla.	Watermelons	May 15	June 15
Thomasville, Ga.		June 15	July 15
Valdosta, Ga.		July 15	Aug. 15

in our Jacksonville office with practically all of the leading shippers of Florida represented. The Government felt that it could not quote brands of fruit in this service, for to do so would be to lay ourselves open to the charge of advertising one man's goods against another's. If we said: "Deerfields were bringing $7 a box on the New York Market" and "Stripes" or "Confidence" or "Isle Worth" or any other of the other brands $6.50, you can see what a source of advertising our bulletins might become and how soon dissatisfaction with our reports might be aroused. We therefore decided to omit entirely the mention of brand names. But the problem then presented itself how could we intelligently quote the citrus fruit market without using the brands with which you are so familiar. We decided to quote fruit from certain specific areas of production in the State and we definitely outlined these areas of production. In our first bulletin and in a special memorandum accompanying our initial report, we decided that the fruit grown in the Southeastern section of the State, principally Dade County, should be quoted separately, and we called that district the "Southeastern District." The "Indian River" section was another distinct district used in our reports, as was the "Central District," the "Southwestern" part of the State, the "West Coast" and "all other Florida." Within each District we quoted on the principal markets of the country Fancy Brights, Brights, Goldens, Russets and in all cases medium sizes. If large or small sizes were bringing a premium or discount that fact was stated in our report. Auction prices were given separately and by cars.

We do not pretend that our market news service on citrus fruit was perfect or that it cannot be improved but we feel that for the first year we have made a good start and that it has been of benefit to citrus fruit growers. We have received many suggestions looking towards the improvement of this particular bulletin and we would be glad to receive more of them. We hope next year to be able to introduce some special features in our citrus news work, placing perhaps, if we have the men available and the funds, personal representatives in certain of the important producing sections centrally located, so that the bulletins may be placed in the hands of the growers on the same day, if possible, that they are issued.

As matters now stand in this State, all of our reports are received in Jacksonville over the leased wire and are then relayed by the usual commercial wires to our men located in the producing sections. I have received perhaps 200 to 300 letters from growers in this State stating that they could not get along without our market news service as it equips them with information they never had before. But very few of these letters are accompanied by specific suggestions and criticisms. This is what we are after particularly for only in this way can we improve our work and give you more nearly the exact type of information for which you are looking.

One feature of all this news work which has proved very valuable to growers is the carlot information. Every railroad in Florida is co-operating with the Bureau of Markets in furnishing us daily with reports as to number of cars of fruits and vegetables moving over their lines, together with the destinations. They also in many cases report the diversions accomplished which gives us a complete record of the distribution of the principal Florida fruits and vegetables. We have not attempted to get diversions, however, on all of the Florida products but simply those in which diversions play a very important part.

The type of bulletin which we are now issuing from Hastings, Fla., for the benefit of the potato growers of the State is perhaps typical of the kind of information we are distributing. This bulletin, issued each day about noon, shows first the F. O. B. prices of potatoes in Hastings. It also shows the prices at certain of the other important shipping points in Florida. We include in that bulletin each day a report of the number of cars of potatoes rolled out of Florida the previous day, together with their destinations; shipments by boat are given and finally the prices at which Florida potatoes are selling to jobbers on the principal markets of the United States, the morning on which the report is issued. You will see that a bulletin issued at noon-time, giving the prices that morning of Florida potatoes on the principal markets, the prices at the important shipping points, the cars rolled and their destinations, distributed free of charge to all interested growers, is information well worth having and which if studied intelligently means dollars and cents to the growers. It places them on a par with the buyers; it gives them definite official information compiled by paid experts in place of hearsay or opinions.

We issue the same kind of bulletin on

all of the other fruits and vegetables which I have mentioned and we hope to continue to extend this service until every important Florida fruit and vegetable has been covered intelligently.

One line of work with which you should be better acquainted and which is closely allied to the market news service is the recently established Food Products Inspection service which is now available to shippers in 27 of the principal cities of the country. On or about May 1st offices will be opened in eight additional markets and we are equipped at all of these points to inspect your perishables upon arrival at the request of the shipper. It is felt that this service protects your interest and the interest of the honest commission man. It gives you the right to have your goods inspected and a certificate issued as to their soundness upon arrival at the various terminal markets, thus doing away in a large measure with false returns on the part of unscrupulous commission men and receivers. We have an inspector in Jacksonville who is authorized, upon legitimate request, to inspect goods anywhere in the State of Florida, and we are ready at any time to give you a list of all of the city markets in which this important service is available free of charge. Certificates of inspection are issued by our representative which are accepted in the courts as prima facie evidence of the soundness of the goods. An amendment to this Food Products Inspection law is now before Congress providing that certificates may be issued upon the request of shippers and other interested parties showing the quality and condition of the goods. We are of the opinion that this amendment will make the law more practicable. The service is proving very popular and we are anxious for all Florida growers to be acquainted with its details. We will be glad to answer any questions bearing upon it from the Jacksonville office.

In conclusion let me ask that all of the citrus fruit growers present at this meeting interest themselves in our citrus market news service. During the past season our first attempt towards a citrus news service met with a considerable degree of success and we served daily perhaps from 1,000 to 2,000 growers with our bulletins. Next year we desire to place this bulletin every day in the hands of twice as many growers and as many more as can use it. It is not too early to direct a request to the Jacksonville office for these bulletins and if you have not been receiving them we would be glad to add your name to our list and give you such material on citrus fruit markets as we issue from the beginning of the coming season.

We should bear in mind that while we have had during the past season a shortage of a few things we have had an average crop of most things. The primary reason, perhaps, for the major portion of our difficulties has been that we have been careless and forgetful of the unusual economic forces that are working in the country.

During the coming year we should all be more mindful of possible economies. We have all got to tighten our belts. By

this I mean that we should eat plentifully but intelligently. We must prevent waste and remember that our thoughtfulness or thoughtlessness in this matter means the difference between a fair degree of comfort and keen suffering to those who have not been so fortunate as to benefit largely by the industrial prosperity that has prevailed during the past two years.

Asst. in Market Surveys, U. S. D. A., Jacksonville, Fla.

Why Co-Operative Marketing Frequently Fails

C. S. Kelley.

The subject on which I have been asked to speak to you tonight—that of Markets and Marketing—is so voluminous that it has seemed best to me to choose only one feature of the many involved, and, in fact, to consider only one part of that feature. So I have chosen the subject "Why Co-operative Marketing Frequently Fails," and modestly hope that my consideration of the same may interest you.

We all of us have our hopes and dreams and ambitions; the Germans dreamed of a world empire, the Irishman dreams of home rule, and our darkey friends of a workless existence; but the dream and hope of the progressive trucker is successful co-operative marketing, and it sometimes seems almost as though their dream has no more chance of being realized than the others.

Every year new co-operative marketing associations are formed in the South, and statistics show that over ninety per cent of them go to pieces after one season. This, though deplorable, is a fact, and as such must have a reason back of it; now, what is it?

It would be a waste of your time and mine to point out again the many advantages of co-operative marketing, for they have been pointed out so thoroughly in every agricultural paper, talked about so continuously at meetings such as these and advertised so extensively that we all of us who make any pretense whatsoever at being progressive know them as we do our A B C's, and heartily agree with the underlying principles. Yes, more than that! Go out among the more isolated farmers who do not get the chance to frequently attend meetings where such matters are discussed and ask even them if they know about the advantages of co-operative marketings, believe in it and would be willing to join such an organization and support it. Eighty per cent of them will emphatically answer "Yes," and when summoned to do so will attend the preliminary meetings, sign the by-laws and promise to give the association their firm support and all that; and yet over ninety per cent of the associations go to pieces at the end of the first season, and some before.

Why is this? The answer is very simple if you will analyze these failures a moment (and you will find the answer is true of almost all of them) because the average trucker and farmer follows too closely the motto on our silver dollars, "In God We Trust," and doesn't trust his brother farmer at all. Possibly one per cent of the failures in co-operative

marketing can be attributed to dishonesty on the part of the officers of the organization or their sales agents, and perhaps two per cent of them to poor management; but practically all of the rest can be attributed solely to two things—lack of trust and lack of "stick-to-it-tiveness." Without a liberal supply of both of these, no marketing organization can long exist.

This lack of trust on the part of the truckers seems to hold true only in the all important matter of marketing their own produce, for they continually co-operate in other ways. Nowadays very few follow the old-time method of hiding their hard-earned savings in the china teapot on the mantel or in a sock under the mattress. Instead they co-operate to make the success of some bank by depositing their money therein and trusting the officers. Very few truckers save their own seed; instead, they co-operate and help many big seed companies along by buying their seed from them and trusting them. They co-operate in keeping alive the grocery stores, the hardware stores and many other enterprises, and do this without even thinking of questioning the integrity of the merchants. Yet when it comes to getting them as a whole to trust each other, it seems almost impossible.

There is, perhaps, a partial excuse for this attitude on the part of the vegetable growers, for until the last two or three years, since Uncle Sam has been looking into the matter, there were many unscrupulous commission men traveling over the country. The trucker, knowing that these men would "do" him if they got the chance, deliberately tried to "do" the commission men by putting up dishonest packs, marking choice stuff fancy and so on, until such procedure became the regular thing, and he thinks his brother in the association is still doing that sort of thing. Possibly such practices are occasionally attempted by some of the members of co-operative marketing associations, but not frequently, and the honest members must trust their management to find the dishonest one and make him honest by education or force, or put him out. While this is being done, the rest must stick together, have abiding trust in their officers and in each other and in the ultimate success of the proposition. Without this trust and sticking together, any organization of any sort is doomed to failure.

Picture for a moment a company of our Sammies in Europe making a charge across "No Man's Land." They have been given careful instructions by their officers as to how they should handle themselves and their guns and bayonets, how fast they should go and where, and so on to the last detail. When all is ready the command comes, and they "go over the top," shouting as they go, having faith and confidence in each other and in their officers and in the wisdom of their instructions and in the cause for which they are fighting. Each one does his very best, because he knows that each of the others is doing the same. On they go; the fight is a hard one. There is, perhaps, a bit of wavering and a bit of faltering here and there, for that is natural; but they hold together, press forward, and in a little time the enemy's trench is taken,

because they had faith and confidence and so could co-operate.

Imagine what would happen if, after they went over the top, one or two of them should decide the captain was leading them in the wrong direction, and so started off at a tangent according to their own notion; then another two or three recalled the oily, seductive talk of an enemy alien, and so slowed down; and three or four more thought they were not getting there fast enough and so turned back; and four or five others passed the word to five or six more that their captain was really in the pay of the enemy; and then a dozen or two of them became doubtful of the soundness of the principles for which they were fighting, and so quit cold—what do you think would happen? Discouraged, broken to pieces, they would be an easy prey and would have to surrender individually to the enemy, as Florida truckers have done so many, many times, and all because of not having trust, confidence and stick-to-it-tiveness.

Our government is doing its part to help the trucker by putting the dishonest commission man out of business, and requiring the rest to take out licenses and render detailed statements of all business done. The government also employs one or more inspectors at each of the principal markets, who will report to the shipper the exact condition of the contents of a car upon arrival. If requested to do so, they will send an expert to any trucking center for the sole purpose of organizing the growers into a co-operative marketing association and help in any other way possible.

We believe in co-operation and co-operative marketing, regardless of the form it may take, whether through a private sales manager or contracting with a reputable firm in the trade or through the Citrus Exchange; for any sort of co-operative marketing is better than the haphazard way now most generally followed.

However, until the truckers have learned the necessary fundamentals of successful co-operation they are not ready for it any more than the Fiji Islanders are ready for self-government; and the fundamentals can be instilled into the truckers only by an educational campaign.

The government is already doing all it can by bulletins on the subject and through its State and county agents. The Florida Citrus Exchange is doing much along these lines; and so should we, as a Society, do all we can to broaden the minds and enlarge the viewpoint of the Florida trucker and farmer so that they may realize that all successful business is founded and progresses only on intelligently placed faith and trust, aided by a large amount of stick-to-it-tiveness.

When they have arrived at this point, co-operation along all lines will follow as naturally as the sunshine follows the rain. And then, and not until then, need we discuss the details of co-operative marketing and occupy our minds and time about the relative value of the various styles of packing, wrapping and branding, and the many other small but essential matters.

The day will come for the Florida trucker, as it has already come for those of California and some other States, when the insufficient motto now so closely followed will be broadened to, "We Trust in God and Our Neighbors." And when that day has come, lo and behold! we have co-operation.

Fort Myers, Fla.

Labor for Groves and Packing Houses

W. A. Dopson.

We can get a correct idea of labor problems only by a study of labor conditions in the past. No one considered it of serious importance. We were aware that skilled labor had organized to better conditions of both the employer and the employee, and that no attention was paid to unskilled labor, as all believed the demand would never be greater than the supply. This idea became sacred to us, and all went well with us.

If any project was undertaken requiring laborers in large numbers, advertisements were placed in newspapers, stating place of employment, wages, etc. If this failed, men were sent out to procure help. Their conception of duty was to get the help needed without the slightest regard for the other employer or the industry from which this help was drawn. Higher wages or better living conditions were offered as the inducement for laborers to change their place of employment.

FIRST CHANGE.

Three years ago the Department of Labor began to give the wheat farmers assistance in harvesting their wheat crop. This benefited the farmers. The work was enlarged in this and adjacent sections as far as the funds available to the Department would allow. Last year it succeeded in sending 84,000 men to farmers. This averaged about one man to 75 farms. And in addition to supplying farm help, the Department was asked to supply help for other industries. This necessarily worked against farmers.

DEPARTMENT OF AGRICULTURE.

The Department of Agriculture took a very keen interest in what the Department of Labor had been able to accomplish. Therefore, when war was declared, and the Secretary of Agriculture and his associates saw that one of the great responsibilities of this country in the war would be to produce foodstuffs in sufficient quantities to feed both ourselves and our allies, this situation brought home the question, how was the agricultural work to be kept at its maximum efficiency, under the condition of a labor shortage. Many thought the farmers should be exempted from military service, and much criticism resulted because this was not done. But it was unfair to the farmers of the nation even to entertain the thought that they were willing to have

the rest of the population do all the fighting in this struggle for world freedom. The farmers themselves, as a whole, would resent the intimation. If farmers were exempted as a class, obviously others would feel the injustice of such action. It is unlikely that any responsible body will sanction this proposal. This is a war for all Americans, in all walks of life.

OTHER INDUSTRIES.

Following the declaration of war, great labor disturbances followed on account of the large industrial developments, redistribution of energy and increased wages. The scale of operations was large, and the work had to be done quickly. Sixteen cities, covering over 250,000 acres, including ranges, had to be built between June 15th and December 1st. This called for 5,000,000,000 feet of lumber, nearly 2,000 miles of pipes for water works and 1,000 miles for drainage. Seventy-five carloads of materials were required for electric lights and roads.

Between 5,000 and 8,000 men worked on each cantonment. They cost approximately $125,000,000. Simultaneously sixteen canvas cities had to be set up for the National Guard.

We thought that when this emergency elapsed there would be less demand for labor, and the wave of an acute labor shortage would pass. But there are today 135 shipyards on the Atlantic coast. (I do not know the number on the Gulf or on the Pacific coast.) These have given work to all those employed on the cantonment work. In addition, all classes of industrial plants are being enlarged, and particularly is this true of the industries necessary for the prosecution of the war.

About two years ago negroes began moving North. I asked employers of labor if in their opinion this would affect the labor supply. The reply was, "No; only a few will go North, but with the beginning of next winter they will come back to the South." This resulted in Florida losing more than 30,000 men. If Florida was the only State affected, she could draw on other Southern States; but all Southern States have suffered similar losses. In fact, I think our loss is among the smallest. Texas lost 125,000 in this "to the North" movement.

The fuel administration announced on the 16th of April that non-essential building operations would be reduced for the period of the war, in some cases 50%. The output of some commodities is to be reduced from 16% to 50%. The effect which this will have on labor will be small and slow in becoming visible, if it shows at all.

Florida will have furnished, by the 30th of April, 8,000 drafted men and 3,600 National Guardsmen. This does not include those who have volunteered for the national army, navy and marine services. I have not been able to get the exact number of these volunteers, but we know it will run well into the thousands; and present indications are that in the future we will furnish men more rapidly than we have up to this time.

This number of men being taken from our protective industries when our ranks are already depleted will have an effect

which we little anticipated a few years ago.

The efforts of the Department are being directed to keep production at its maximum efficiency, to utilize and properly distribute all available labor in order that farmers may be made safe. The reason for the government taking hold of the labor problem is to insure the production of foodstuffs.

In order that farm labor may not be unnecessarily disturbed, an order has been issued by the Provost Marshal General placing skilled farm laborers at the foot of their class, and calling those not so engaged out of their regular order. Furloughs will be granted whenever it can be done without serious interference to the soldier's training. I mention these facts to picture more vividly to you the seriousness in which the government views this question.

There is an undisputed labor shortage. The extent of it can not be correctly determined, because many agencies are so closely allied with it that it is very difficult to draw sharp lines circumscribing the limitations of each. It is sufficient to say, it is one of the greatest problems confronting the agricultural interests of Florida today. You are expecting me to tell you how to meet and solve these problems. I think it is well just here to briefly mention the history of our work in the State.

During May of last year a survey of the labor situation in the State was made, which resulted in my beginning this work June 1st. The first problem was to get the plan before the people so that it would be clearly understood. Blanks were sent out, asking for a report on labor conditions. All those reporting stated that conditions were normal; that is, there were no demands which could not be supplied locally, but, on the other hand, there was no surplus. While I failed to get the information I had hoped to get, I succeeded in arousing interest. I had numerous inquiries about where surplus labor had been reported.

Next, I encouraged farmers, whenever practical, to employ more labor during the summer than they had been in the past, because idle labor might easily become the prey of labor agents from other sections. My suggestions were accepted, and farmers were benefited.

THE FIRST VISIBLE LABOR SHORTAGE.

The first apparent scarcity of labor occurred in the cotton section, during harvesting season. This was solved by asking the housewives over the State to stop cooks from carrying pans of food from their kitchens, by demanding rigid enforcement of vagrancy laws, and by interesting the town boys. The boys responded nobly, and in some cases the girls went out and "picked cotton."

"Pan carrying" is a factor that deserves consideration. The stopping of this practice was not suggested on the theory that it might help, but upon the result of investigations made which showed that nearly ninety per cent of the cooks in some sections were practically supporting one or more able-bodied men (parasites) and enabling them to live in idleness. In many cases the men forced

their wives and daughters to supply them food in this way. It is not necessary for me to go further into the effect of this system. However, I will add that many cooks quit, and quite a number of good housewives were *"read out in church,"* but it helped.

LATER DEMANDS.

Soon after the cotton crop was harvested, I received demands from over the entire State for help. At this time the cantonment work was in progress. This forced us into competition with employers who could pay more than the farmers and fruit growers. But by carefully laid plans and persistent work, we succeeded in getting many to the farms in all sections of the State.

The cards, which we gave each applicant, were not returned in every case, but our records show that we directed a few over four hundred to fruit work. I realize very keenly that many of those sent turned out to be worthless. I regret that this was true, but we must all agree that the plan was new and we had no precedent to follow. Therefore, we were left to meet the situation as it presented itself; and I may add, no one was bothered with men of this type a second time. The greatest criticism the Department has had to make of the farmers of Kansas was: "If a man wanted ten laborers, he applied for forty," which means he hoped to get ten out of forty. I hope to avoid this practice, and by close co-operation we can avoid it. May I now assure you of my hearty co-operation, and ask you that you give us yours? We can not hope to accomplish all we would like without carefully laid plans and a successful execution of the same.

We used all means available in locating idle labor, and placed this labor most advantageously. This was very difficult, as there was very little idle labor then. The labor that could be used to the best advantage was seasonal help, which would be needed in different sections of the State at different times of the year, and could be shifted to places where most needed.

OUTSIDE HELP.

Recently, with the assistance of others in this Department, a survey of available labor in all the Southern States was made. We secured a few laborers at New Orleans. I consider this a clear insight into the conditions in other States.

After we had exhausted all sources of supply within a reasonable distance, we succeeded in getting the operation of the emigration laws so modified that Bahama Island labor could be imported for agricultural purposes in the lower East Coast section of the State. The value of this labor can hardly be over-estimated, as the farmers would have lost heavily had they not been able to secure this help. I have just come from there, and I found both the farmers and laborers well pleased.

This matter has been handled thus far in a very satisfactory manner to all departments concerned. Therefore, I see no reason for this privilege not being extended when emergencies demand it. Labor must be imported into this section, for seasonal help, at least. As this labor has been

used here for many years, the farmers would be seriously injured without it.

PLANS FOR THE FUTURE.

What developments the future has in store for us, no one would dare predict, but I feel safe in saying that unless peace happily interrupts the progress of the war, we may expect labor to be more scarce during the next harvesting season than it has been for many years. I am forced to speak frankly, and say that all indications at this time are that more inexperienced labor will have to be used in citrus work than has ever been used in the past. Therefore, I suggest that plans be made to employ as many women as may be practical in packing houses. They are less migratory than the men, and, in most cases, are more faithful help. This would release men for picking and other outside work.

The question of wages presents itself at this point; and may I insist on a uniform wage scale? The employers and not the employees must necessarily be the losers if they continue to bid against each other. Inexperienced and inefficient help is the most expensive help in all lines of work. Therefore, uniform wages and requirements are highly essential at this time.

I cannot successfully deal with individuals in all cases, but I can deal with communities. I do not consider it is asking too much to insist on co-operation at this time. The value of team work can not be over-estimated.

In support of this argument, a national labor director will be appointed soon (perhaps today). This was brought about by duplication and over-lapping in different organizations, which has caused much unrest in labor affairs. I welcome the idea of a central power for the direction of labor. This is intended, according to the papers, to apply to labor employed in the production of war supplies. But its effect will be felt by all industries, because farmers and fruit growers must compete with all classes of industry in wages to secure help.

Wages is a factor that is demanding attention. Therefore, I want to make a suggestion for your consideration. Employ packers during a certain service on the plan of so much per box; then, if they prove to be satisfactory help, a small increase may be given; and so on. This would have a tendency to discourage changing of places, and encourage efficiency. If practical, other classes of work should be handled in a similar manner.

I can assure you that the labor division of the Department of Agriculture is at the service of the farmers and fruit growers of our State, and that we have had the most loyal co-operation from the employment service of the Department of Labor. With these organizations assisting, I see no reason for the fruit crop of this year not being harvested with reasonable ease. But we must have co-operation in enforcing laws against idleness, prohibiting cooks from carrying food from the homes in which they work, a uniform wage scale and uniform requirements of the help.

Office of Farm Management, U. S. D. A.,
Gainesville, Fla.

DISCUSSION.

Mr. ——: We find in this State that the government employs labor, and they bid much higher than the farmer or grower can pay. They not only bid higher, but they put a lot of their advertisements in our papers offering $2.10 and $2.20 per day of eight hours' work, and draw our labor from us.

Now, I am as loyal as any man living, and will do anything in my power to help at this time. I want them to do the same thing. I have been employing during the past season from six to ten negroes. We see these advertisements, and my neighbors would bring them to me, showing where the government is bidding and taking our labor because they are offering more wages. The government's attention has been called to this, and it should have been stopped. These glaring advertisements for eight hours' work were printed when they were calling upon us to grow more stuff, to grow more food. Now, how could we do it?

However, I believe that some of the strain of the labor situation is over, at least in our section. I believe it is a little bit easier than it has been for two or three months past. I would like for the gentleman who has just read the paper to tell us something about that.

Mr. Dopson: The government was not directly responsible. The cantonment work, which is evidently the work you mean, and which took your labor from you, had to be done by contract. So much had to be done in so short a time that there was no time to get it done except by contract. The contractors felt it was necessary on their part to offer the wages in order to get the labor there and get the work done at the time when it was required. It was short time labor only. The war would not wait until the crops were harvested, you know.

However, we must admit the privilege was abused, and we are now trying to work out the problems; but they cannot be solved in a day. An emergency was thrust upon the country, and it had to be met the best way we could. War is the first business we have. I hope the keen competition for labor is now over.

Mr. Rolfs: Those conditions have existed all through the country. And I want to say to the audience here that there was only one cantonment in the whole United States which was behind time. (Applause.) That was an achievement. Rather than to keep the million or more soldier boys back a single day, we had better pour out the money like water; $125,000,000 had to be spent, and it had to be spent on time. Things had to move like clockwork, and if we had to suffer some inconveniences, let us remember what those soldier boys would have had to suffer if we had not. It was inconvenience to us, and perhaps involved the expenditure of a few hundred dollars more; but what might have happened to the hundreds of boys if they had been sent to a cantonment unfinished, unequipped and insufficient? We knew those cantonments had to be built, and those boys were to be drafted and we should have made plans to meet the emergency.

We hear a good deal of complaint about wastefulness at cantonments.

That can't be helped. There is wastefulness, but oftentimes the saving of it would not be worth the labor that would have been necessary to have conserved it. I know in some cases where the criticism was brought, especially against the cantonment at Columbia, it was propagated by the Kaiser's emissaries and spread by the good men of this country.

Now, we have to look out; the spies are among us, and they will set all sorts of traps to ensnare. When we come up against these little difficulties, the inconvenience of losing a little help is nothing as compared to some of the hardships our boys would have had to go through had they reached the cantonments and found they had no roof over their heads, no blankets to keep them warm and no fuel to keep them comfortable and healthy. Which would you choose—a few boxes of unpicked oranges or a soldier boy dead with pneumonia? We have to look at the other side; and in my opinion the other side so far overshadows our side that there is no time to think of ourselves. We are at war, and let us stand back of every department of our government. War is the first thing there is under consideration now. I have suffered with the rest of you, so I know what I am talking about.

Let us take to heart what Mr. Dopson has given us. I would not be surprised if next year we did not have to pack practically all of our fruit through the hands of women. If we do, we will go at it just as cheerfully as we are going at the difficulties we are meeting now. There are very few people who are not coming up to the scratch and doing the very best they can. Let's not get disgruntled and discouraged because things are not going on as they used to when conditions were normal. Our minds were made up for business, and we are going to have some severe jolts when it comes to the transportation question and marketing problems.

Mr. Hume: I think the remark I made this morning will fit in again: Cheer up; the worst is yet to come.

Mr. ——: There was a man at Winter Haven trying to get some of our labor away from us. The city arrested a lot of the laborers for selling whisky, got them in jail, sentenced them and kept them on the street until the man left town. (Laughter.)

The Marketing of Citrus Fruits in the Early Days

F. M. Leonard.

I first went to Florida in the fall of 1877, remaining there on this first visit about a year and a half; then came north to spend the summer and returned to Florida in the fall of 1879. On this second visit I only spent one winter there, returning North in the spring of 1880 and have resided in the North ever since. I have been continously interested in the sale and distribution of Florida products, largely citrus fruits, since that time and, although I have made my home in the North since 1880, I have frequently visited Florida and all the time have been much interested in her advancement, particularly along the line of production of citrus fruits.

When I first visited Florida in 1877, the citrus industry was comparatively in its infancy; although one thing that impressed me very strongly at that time was the fact that, in listening to the conversation of any little group of men, I noticed that the universal topic of conversation was the orange business; the making of groves and fruit. I noticed particularly that, while the industry was in its infancy, the men who had started it and had only been in the State a very few years seemed to have, by their conversation, a vast knowledge of the citrus business and how to grow fruit in all its details. A great many of the points made were stated as well-known facts and affirmed with a great deal of positiveness; so that, as a new comer, I was wonderfully impressed with the great knowledge of the citrus industry that many of these men seemed to possess. However, as the years have gone on, I have frequently had occassion to modify my estimate of such superior knowledge claimed by some of the so-called "old settlers" at that time.

I had been in Florida but a few days when I went to work in the packing-house at San Mateo of the Hon. P. P. Bishop, who was the dominant influence and managing head of the orange growing firm of Bishop, Hoyt & Co., then very prominent in the State. I was almost continuously associated with this firm, not only in Florida, but as their representative in Boston for the sale of their fruits, until the time of the big freeze in 1894 and 1895 and, shortly after, the death of Mr. Bishop. My business connections with Mr. Bishop and his firm are some of my pleasantest business recollections during the whole course of my business life.

I well remember the primitive methods

employed in the packing-houses at that period, (from 1877 to 1880), but we thought, at that time, we were doing the best of work. Everything was done by hand; sizing was done by the eye, and the wrapping and packing were two separate operations.

While there is a great deal of fault found with the transportation methods at the present time, they are vastly different from what they were then. The Bishop groves were located on Orange Lake in Marion County and, during the first winters I was in Florida, about the only way to get fruit out from that section was to haul it some twelve miles through the flat woods to the Ocklawaha River. It was then loaded onto the Ocklawaha boats which took it down to the St. Johns River to deep-water navigation, where it could be rehandled, packed, and forwarded to New York, or any of the northern markets. On account of all of these different changes and the slow movement of boats, the fruit was necessarily a long time off of the trees before it reached the market; and, owing to the rough handling, there was but very little fruit that arrived at its destination in what we would today call good condition. There has been more improvement in the handling, packing, and shipping of fruit during the period from 1877 until the present time than there has in growing it, although there has been a great advance in that line.

In the early days, the fruit in a great many cases arrived in such bad condition that it was necessary to repack the fruit before it could be sold to advantage; but now under improved methods of fertilization and cultivation and the greatly improved methods of handling, fruit that has to be repacked is the exception. With our modern packing-houses, equipped with washing and polishing machinery, and the much better care given in handling, there is very little fruit but what arrives in good condition, unless it is on account of extreme adverse weather conditions during gathering time, or fruit from soils, that will not produce good-carrying fruit.

I well remember the first consignment of Bishop-Hoyt fruit that arrived in Boston market. It was a *very large* shipment of *fifty* boxes and it was a question how so much fruit could be disposed of to advantage; but, after repacking and putting in good shape for the dealers, it was finally disposed of, largely in the neighborhood of $5.00 to $6.00 a box. Now, owing to the better condition in which the fruit arrives and the very greatly increased demand for fruit, it is far easier to sell several carloads than it was that first shipment of fifty boxes, although of course the prices in a normal year are very much lower than they were at that time.

The output of citrus fruit from Florida has grown from a few hundred thousand boxes in 1877 to the present immense output of something like eight million boxes in a normal year; furthermore, at that time there was little, if any, California fruit. Now their output in a normal year is very largely in excess of Florida's

output, showing the vast increase there has been in the consumption of citrus fruit in the country during that time. This increase applies to all other kinds of fruit as well as to citrus fruits.

Boston, Mass., Paper No. 1 from Committee on History.

EARLY DAYS AT CITRA, FLORIDA

A. S. Kells.

Mr. A. S. Kells of Steubenville, Ohio, went to Florida in Nov., 1876, through the influence of Mrs. Wiser of that city who had gone to Orange County, Florida, about three years before this time. She wrote of the wonderful climate, and prospects in orange growing, which made the call of the south very alluring. So five men from Steubenville went to investigate. Upon arriving at Jacksonville Mr. John O. Matthews met them, and asked them to go with him to Orange Lake, Marion Co., Fla., where he had orange lands to sell. He and his partner owned 200 acres of wild orange groves, so the party went with him. The party inclued Mr. A. S. Kells, Dr. Oliver Kells (his brother), Mr. W. B. Lindsey, Mr. Robert Hawkins, and Mr. Thomas Johnson.

The only way into this wild country at that time was by the beautiful Ocklawaha River. They landed at Iola, where they took a mule team, and drove 16 miles into the dark, dense forest. At sundown Mr. Matthews pulled up to a cabin. An old colored woman, Mr. Matthew's cook, called out, "Who dar?" Mr. Matthews said, "auntie, supper for six." She informed him "dar was not a bite for white folks to eat in de whole house." Mr. Matthews saddled a mule and she rode 3 miles to the nearest neighbor, Mr. John Harris, to get some provisions. The appetites of these men was somewhat sharpened by the time Aunt Martha returned and had prepared the meal.

In the absence of a cooking stove, she made a fire in the yard, fried bacon, and baked some "so-called" biscuit in a "spider oven." At last supper was ready, and the hungry men ate ravenously, while Aunt Martha stood by, holding a fat-wood torch, the black tar running down her arm. After the meal was over they sat by a fat-wood fire made in a sand box, until Mr. Matthews suggested they retire as the fire was burning out.

There were very poor accommodations for six men. They drew cuts to see how they would sleep. It fell to the lot of Mr. Lindsay & Mr. Kells to sleep in Aunt Martha's bed (she disappeared somewhere). The other men slept on the floor on whatever they could find. It fell to Dr. Oliver Kells to sleep in the middle, between Mr. Johnson and Mr. Hawkins. It was a very warm night, and he did not altogether enjoy his lot. When the last fat-wood knot burnt out, the rats came forth to get their suppers from the sack of corn under Aunt Martha's bed. It is needless to say the men, excepting Dr. Kells in the middle,

did not sleep. The other men hammered the floor all night and kept the rats off while he slept.

The next day Mr. Matthews showed them over a beautiful tract of wild orange grove along Orange Lake front, consisting of 1,000 acres, of which he and his partner owned 200. It was presumed to have been planted by the Indians or Spaniards.

The Indian mounds and shell mounds found in these regions point to the fact that Indians had dwelt there. Some of these mounds were excavated and pieces of pottery and Indian relics were taken from them.

This wild country threw its spell over these men and they formed a company and bought 100 acres of land from Mr. Matthew's partner, Mr. Vincent.

They left them to tell the tale of the wonderful opportunities of the Southland to other northern friends, among whom they had many listeners.

In a few months Dr. Oliver Kells went down with his family to take charge of the place. He found it so wild, and far out of the world, that he only remained a short time. Then Mr. Albert Kells, his younger brother, started forth to try his luck and grit in the new land. He took his family also, Mr. D. S. Borland, brother-in-law of Mr. Kells, accompanied him. They went the same route up the Ocklawaha to Iola, and the 16 miles drive into the wilderness. They went to the cabin in the grove, built an addition to it, stopped up the rat holes,whitewashed it inside and out, opened their furniture and lived comfortably for six months, until they could haul the lumber from Iola, and build a small house in the pine woods about one half mile away from the hammock lands.

The greatest deprivation was food supplies. Everything was hauled from a little store 6 miles away at Millwood. The nearest postoffice was at Ocala, 18 miles away. Some one of the little settlement went once a week for the mail. There were five or six families in a radius of 4 miles.

After they were more comfortably located in the "Piny Woods," everything went better. Malaria was a terrible drawback. It molested every member of the family, but they all lived through it.

The cultivation of these dense wild orange groves was very difficult. Some of the wild orange trees were six to eight inches in diameter; and they grew so thick that it was impossible to walk through without first cutting a path. Many had to be cut down; others were dug up, and transplanted as new land could be prepared. Later on some were sold to new comers.

These wild groves were not in straight lines, as the orange groves of today, but were here and there in their original stand. The wild trees were cut off and budded, and produced fruit in two years from the bud.

The transportation was a great drawback to the growers in those days, the fruit being hauled to the Ocklawaha River at Iola, 16 miles away, by mule teams. It took a team one whole day to make the trip. It wasn't very long until the Florida Central & Peninsula Railroad reached Lockloosa, but owing to the long trestle to be built over Orange Lake it

was delayed in coming to Orange Lake. The fruit was taken from the grove in flat boats, through channels cut through the "bonnets" and floating islands out to the main channel, where a small steamer met it and took it through Peegee River, or Alligator Creek and across Lockloosa Lake to the railroad.

The fruit was sized and sorted in a very primitive manner. An orange of the size to be packed in each box was placed directly in front of the man doing the work and he sized by eye. Later, boards with holes cut in them of the size of the oranges to be packed, were placed over the boxes, and every orange was fitted, or sized through them. The H. B. Stevens sizer came into existence, and was used for many years until the late improved machinery was invented. Washers were not used in those early days, as the fruit was bright and beautiful. No fertilizer was needed for many years. The orange boxes were strapped with wild grape vines until the Bangor hoops came in.

One day the Florida Central & Peninsula railroad engines thundered down the tracks. The negroes and whites, many of whom had never seen an engine, collected from miles to welcome this wonderful event, which connected the first settlers around Orange Lake with the outside world. It was not long until many people began pouring into the little settlement. A school house and several churches were erected. The little town was named Citra, on account of its production of citrus fruits. The production of oranges increased very rapidly. It was not long until the whole 1,000 acres of wild orange grove was under cultivation, and the Citra groves were known far and wide. In December, 1894, and February, 1895, these beautiful groves were cut to the ground by the terrible freeze. They were all about 20 years old, and it was a sad sight. But with the same perseverance and energy which characterized their first attacks on the wild groves, the Citra growers at once pruned back and rebudded their trees, and the present thrifty groves are the result.

Beaver, Penn. Paper No. 2 from Committee on History.

REMINISCENCES OF A PIONEER ORANGE GROWER

H. B. Stevens.

Mr. O'Byrne, chairman of the Historical Committee, has asked me to prepare a brief account of my experience in the early days of the citrus industry. In complying with his request, I make no claim to any expert knowledge or to speak with authority, for I realize that there are others far more competent to depict those good old times than I am. But I feel it incumbent upon me to do my little bit toward passing on to future generations the lessons gained in the hard

school of experience. And I sincerely hope that my humble effort may be the means of influencing some mightier pen than mine to set down the story of the childhood of our industry ere it be too late.

Like so many of our citrus growers, I am not a native-born Floridian, but came to our State hoping to find in its genial climate and productive soil the secret of health, wealth and eternal youth. I arrived in Jacksonville in January of 1874, and happening to meet Mr. P. P. Bishop, was invited by him to visit his grove on Orange Lake, near the present town of Citra. While I was there he asked me to "keep the time," for his workmen during his absence on a trip to Orange Bend (near Leesburg), where he was planting another grove. At that time the men were clearing up what is known as the "Brown and Allen Grove," a piece of hammock with quite a large number of wild orange trees on it. It was new work to me, of course, as I had just come from a lumber yard. The men were felling forest trees, piling brush and rolling logs. As I had been asked merely to "keep the time," I did not feel that I had any authority over them. But wishing to see Mr. Bishop's interests served, I took hold and tried to get as much work as possible out of the shirkers, with the result that we finished that grove and had done a day of work on his own grove by the time he returned. He was so well pleased that he asked me to go to Orange Bend with some of his men to do some clearing there.

At that time there were no railroads south of Jacksonville, and it was necessary to make the trip to Orange Bend by steamer up the Ocklawaha. The work there was soon finished, and I was ready to return. When the steamer touched at our landing on the way up stream, the captain introduced to me a passenger to whom, he said, Mr. Bishop wanted to sell half of the grove. I showed him over the property that evening, and the next morning, as we went down the river together, I succeeded in making the sale.

About that time I received a proposition from an uncle to be one of a party he was taking to the Republic of Colombia, in South America. After spending a year there in gold mining operations, I returned to my home in Dayton, Ohio. I had been there but a short time when Mr. Bishop happened to pass through, and on learning that I was there, asked me to return to Florida and assume charge of his grove at Orange Lake. I accepted his offer and came South again in November of 1875.

At this time we were transplanting a lot of wild trees taken from hammock in another part of the grove. We planted without using any water, as Mr. Bishop thought that with such fine roots, and being out of the ground such a short time, they would surely live without it. But it happened to be a very dry fall and most of them died. Only a dozen or so lived out of about two thousand. Shortly after this I had to plant some trees at Orange Bend, and my instructions were to haul some muck from the swamp and put a load where each tree was to be planted. The muck had just

been hauled when a heavy rain converted that flat land into a lake, with only the tops of the piles of muck showing above the water. It was, of course, impossible to plant trees in the water, so I first drained the land and set the trees in the wet ground. It turned out that they all lived and thrived.

In March of 1876 we had a heavy frost that injured new growth on trees unprotected by forest timber. But as most of Mr. Bishop's wild grove had some forest trees still standing among the orange trees, these were not hurt by the frost. But in an adjoining grove from which all the timber had been removed, the orange trees were seared quite badly.

The following summer I went to Dayton and was married, but as I had no house to live in, I had to leave my wife there until I could build one. At that time there were no hotels or boarding houses nor accommodations of any kind at Citra where one could stay and be comfortable. We moved into our new home the first of December, 1876. That night I spent in the grove firing, in an endeavor to save the trees. Also the next night. On the morning of the 3rd the thermometer stood at 18° F. All the fruit was frozen, and we had not shipped a box. It was a hard blow to Mr. Bishop, since he had assured his partners that he would not ask for any more money to finance the grove, expecting that crop to carry it along. That freeze came the first of December, after a dry summer, but Christmas week it rained all week, and there was not enough cold the remainder of the winter even to kill weeds.

In the fall of 1877 we shipped our first crop. We picked and packed in the same boxes that the fruit was to be shipped in, and hauled it twelve miles to the Ocklawaha River. It went by boat to San Mateo, where it was graded, sized by hand, and wrapped and packed for shipment North. Our pickers used their pocket knives, and we soon found they made a great many culls by accidental punctures of the rind with the point of the knife. I had a shot soldered to the end of the knife, and that helped some, but they were still unsatisfactory. Mr. Bishop invented a circular pair of shears like two hoops with a leather cup on the back, so that when they were closed they formed a ball. They were pushed over the orange while open, and were then closed, cutting the stem wherever they happened to strike it. This, of course, caused many culls by puncture from long stems. We worried along for several years with various tools, trying to pick the fruit as it should be done, until some one brought out the clippers with curved blades. The darkies would use these to cut their tobacco, and thus a great many of them were sprung out of shape and spoiled. So finally we required the pickers to furnish their own tools, and charged them with the value of the fruit that was damaged by improper clipping. In this way we finally obtained better results.

In 1879 we wanted to fill in some missing places in one of the groves. I remembered the loss when planting without water. The log heaps prevented a team being used, so I adopted the plan of build-

ing a tram road from a nearby pond, to where we wanted to set the trees. On the cars I put some barrels with cleats nailed to the sides, and had a stretcher made to enclose a barrel below the cleats. When the barrels had been filled with water from the pond and drawn out to where we were planting, two men would take hold of the handles of the stretcher and carry the water wherever it was needed.

By using plenty of water, we made every tree live; and just to see what *could* be done, I moved two trees with most of their tops and full of bloom. The next fall one of these trees bore twenty-six mature oranges and the other more than fifty. That convinced me that an abundance of water is of vital importance when setting out trees. So the next spring we bought a portable force pump and sunk wells at regular intervals throughout the groves. By locating each well in the center of a square four acres, 250 feet of hose sufficed to place the nozzle on every tree in the four acres. Thus with the force-pump we could give the trees all the water they required when planting, and all they would need throughout the summer. We planted 1,500 trees that spring, with the loss of only three. The fourth year after they were moved we tallied the fruit picked on each tree on two rows through the middle of the grove, and found that they had borne from two to eleven boxes per tree. This success resulted in a big demand for large trees; so that, whereas before we could not sell them at all, we now sold large numbers for five dollars apiece at the grove.

In the spring of 1880 the railroad (now a part of the Seaboard) reached the Bishop grove on Orange Lake, and the men who had been packing at San Mateo were transferred to Citra. As a packer of unsized fruit, I had gained quite a reputation for speed. I used to have a table which I moved from place to place in the grove where the men were picking. Thus I would look after the pickers and be packing at the same time. For a long time I could not find a man who could nail the covers on the boxes as fast as I could pack them. But when it came to sizing the fruit by eye, I found I could not pack at all. I said to Mr. Bishop: "We ought to have a machine to size this fruit. This way it is not sized at all." He asked me how I would make such a machine, and as fast as I would make suggestions he would show reasons why it could not be done. About that time I heard that Mr. O. H. Wade had thought of a letter V, down which the oranges could roll, the little ones falling through first and the larger ones going farther down. Taking that idea, I made a machine having inclined troughs with parallel sides. One of these sides was fixed and the other adjustable, so that the width of the opening could be varied at will. The orange would roll down the ever-widening trough until it fell through. To prevent bruising, I fixed a cloth apron like a pocket under each side where the orange should drop. This apron terminated in a stocking with the foot cut off down through which the oranges would fall. Below the stocking, on springs, I set an orange box, so adjusted that the

heel of the stocking reached to within the height of an orange, above the bottom of each box. There were two troughs, or runs, so that with two men sorting the oranges and rolling them down, they would fill both ends of the box at once. As the box filled the increased weight compressed the springs, allowing it to sink lower, thus making room for more fruit. When the box was full it was removed and an empty one put in its place. Mr. Bishop came into the packing house one day after I had set up my first sizer and packed a few boxes himself. They packed out so nice and uniform that he came to me and said: "Stevens, you had better take out a patent on that thing." This I did, and it was the first complete orange sizer used in Florida.

One day Mr. Bishop asked me to try an orange from a tree near which we happened to be standing. Then he asked me if I noticed anything peculiar about its flavor. I told him no, but I had for some time considered it the best orange in the grove, and I could tell it as soon as my hand touched it, by the smooth, firm feeling of the rind. He then told me that when he was looking around for desirable wood with which to bud the sour trees, he arranged with Dr. James B. Owens, who lived about six miles south of Citra, to let him have the tops of nine large seedlings that he intended to move anyway. Mr. Bishop paid him $200 for the privilege of taking them as needed. When he was getting these buds one of Dr. Owens' daughters told him that they called one of those trees their "pineapple orange," because they thought it had the flavor of pineapple. I told Mr. Bishop that I could not detect that flavor, but that it had a decided flavor of its own, and a very "moreish" taste. After that I took pains to bud all I could of that variety. When we had enough of the fruit to pack by itself, I asked Mr. Bishop to have a stencil made with a picture of a pineapple on it and the words, "Bishop, Hoyt & Co" above the cut and "oranges" below. Then I packed under that brand only the very best oranges of that variety. Some of the other growers ridiculed the idea that we had any different orange from theirs, and laughed at the idea of a "pineapple orange." But the public seemed to think differently, and were glad to pay an extra price for it. As a matter of fact, it leads the market today.

In the early days we did not know what it was to be bothered with insect pests, and the only fertilizer we used, except as an experiment, was the top soil taken from parts of a hammock that were too low for planting orange trees. Later we got to taking muck from Orange Lake. For this purpose we installed a steam dredge and a system of tram roads throughout the grove. The tram track was eighteen-inch gauge, and had sixteen pound iron rails, laid on live oak ties. There was a small locomotive that pulled twelve cars, each loaded with about a ton of muck. It made a round trip to where the men were spreading it every fifteen minutes. The cars were low flat cars four feet wide and eight feet long, with iron wheels, axles and journals. We used light wood frames like a wagon bed to hold the muck. These were easily lifted

off when removing the load. The cars were switched from the iron-railed main line by means of a portable turntable, and run onto temporary wooden tracks laid on top of the ground at right angles to the main line. These temporary wooden tracks were made of 2x3 inch pine rails laid on 1½x4 inch ties, with 20-d nails. A mule would draw the cars as far as necessary, and the muck was then spread directly from the cars by means of shovels. The temporary tracks were moved from time to time as the ground alongside was covered with muck. The cars were run out to the dredge, which was necessarily a short distance from shore, over rails laid on pontoons. These could, of course, be moved about whenever it was found necessary in order to take muck from a fresh place. This muck proved to be an excellent fertilizer, and its effect was seen for a long time after even a single application.

At that time we were troubled in some parts of the grove with what we called "dead stem." The stem of the orange would die just below the fruit and the fruit would drop off. We noticed that where we spread our muck the "dead stem" would stop even to the half of a tree; the dead stem would show on the side where no muck had been applied, but not on the other side. On one tree which had received top soil from the low hammock, I applied some high-grade potash the second year afterwards. The tree acted as if it had received an overdose of ammonia. The leaves became dark and the fruit coarse. On talking this over with a Mr. Stafford, who was with the Mapes Fertilizer Co., he advanced the opinion that the potash had released the ammonia from the muck and the tree had absorbed it.

The first insect which caused us any trouble was the long scale, as we called it then, but now known as the purple scale. When it appeared we feared the orange business was doomed, but began to try different remedies with varying success. I succeeded best with a solution of Peruvian guano, using one pint to a bucket of water. On one occasion I wanted to spray a tree in my yard, and brought up half a bucket of guano, telling my man to spray it in the morning. When I came out he had just finished spraying the tree. I asked how much of the guano he had used, and he said, "All of it." "Well," I said, "That tree is done for." But it turned out that every leaf which had any scales fell off and the tree put out new leaves. It was not again infested with scale up to the time of the freeze. A doctor from North Carolina whom I happened to meet on a train said he thought "Germicide" would be the very thing for the scale, and offered to send me some if I would try it. I mixed it according to his directions and started out to spray with it. Finding a limb infested with soft scale, I decided to spray this first, leaving the remainder of the tree unsprayed. Then passing on to some large lemon trees which had considerable scale, I sprayed these also. A few days later, on looking to see the result, I found that the limb I had sprayed first was dead, and holes had been burned into the fruit wherever the solution had touched. I

thought surely the lemon trees would all be dead, but when I came to them I found they were practically uninjured, very little of the fruit being touched and none of the wood. All the infested leaves had fallen, but the trees being so large, there had not been enough of the spray to injure them, as in the case of the first limb sprayed. I made my report to the doctor, and he wrote that I had not used it properly; it should have been applied with a camel's hair pencil, which, of course, was ridiculous with trees twenty feet high and about the same in width.

One pest followed another, and after the freeze of 1886 we were struck by the rust mite. We had never been bothered with them before, but that year our fruit was black as a result of their work. At first we did not know what caused this rusty black appearance, and various explanations were suggested. One amusing incident that will bear telling was a remark to the effect that the oranges on Mrs. Harriet Beecher Stowe's place near Mandarin probably turned black because she loved the darkies so well. We tried spraying with lime and sulphur, making our own solution. We took a peck of lime and ten pounds of sulphur, well mixed together. To this we added water enough to slack the lime and then added about fifty gallons of water, stirring well. After settling, we would syphon off the clear liquid, being careful not to get any of the sediment. Once the men were a little careless and let the syphon down too low, getting some of the sludge. Four trees were sprayed with this tank of solution, and it was the most perfect bit of whitewashing I ever saw. Every leaf and twig glistened with a perfect coat of whitewash. In a few days I noticed that these trees were badly infested with scale. In fact, they were the worst infested trees we had in any of the groves. I have since learned it was due to the protection afforded by the whitewash to the scale from its parasitic fungi. It was enabled to multiply much more rapidly beneath that protective coating.

In 1888 we started a grove near the outlet of Lake Panasoffkee. The next year, on making a visit to this property, I took a short cut through a neighboring tract known as the "Tropical Grove," and there noticed some little white insects flying about among the trees. I could not make out what they were doing, so called the foreman and asked him what they were. He had not noticed them before, so I suggested that he bring them to the attention of Mr. J. A. Harris, who was manager of that grove, for I had never seen anything take a liking to an orange tree that did not bring trouble. On my next visit I did not see anything of them, and dismissed the matter from my mind. But the following year I noticed they were in my own grove. The leaves of the trees began to turn black and had a kind of smut on them, but the under side turned yellow. I thought something terrible was going to happen to our trees, and asked a Mr. McMasters, of the firm of McMasters & Miller, insecticide manufacturers, at San Mateo, to examine them. After careful examination, he decided that the yellow thing was a fungus feeding on the larvae of the fly. It was,

therefore, a friend. The flies soon spread along the railroad and made their appearance at Citra. We tried every kind of spray, and also fumigation.

The chief difficulty in spraying was the matter of transporting the solution to the spray carts. Our grove was budded in its natural state, and the logs and debris of clearing still lay where piled. Thus there were no plain roads through the grove. My brother, Mr. J. H. Stevens, of Dayton, Ohio, was visiting me one winter when we were fighting the white fly, and suggested a water motor to pump the solution, using the pressure from our irrigation plant.

I have already described the system of wells in the center of every four-acre tract, from which at first we pumped by hand. Later we had mounted a steam boiler and pump on a tram car, and would bring this up alongside a well and pump water through a number of sections of two-inch iron pipe laid on top of the ground, and having brass couplings with hose thread at every other joint, so that they could be coupled or uncoupled quickly. We attached our motor to the end of this pipe, and as we moved toward the steam pump would disconnect what we had used and move forward to the next line where we wished to spray. In that way we got along nearly as well as with the permament irrigation systems installed in some of the other groves I had in charge.

The motor was of the type of those commonly used in city dwellings to pump water from a cistern to a tank for supplying the bathroom. They are connected with the city water in such a way that all the water drawn from the city mains must pass through the motor and perform work. We mounted this motor on a low two-wheeled dray, together with two barrels and a can of the concentrated stock solution. We would make up a barrel of spray, and while pumping from it would prepare the next batch in the other barrel by putting in the proper quantity of stock solution and then allowing the exhaust water from the motor to run in, mixing as the barrel filled. From the motor we extended, in opposite directions, two lines of ¾-inch hose, each 200 feet long. To these we attached four 100-foot branch lines of ½-inch hose by means of T connections, placed 50 feet apart. There was also another 100-foot line of ½-inch hose attached directly to the motor and extending in a direction parallel to the branch lines. Thus there were nine nozzles supplied from the one motor. Each man began spraying 100 feet back of the cart, and moved forward 200 feet, spraying two rows as he went. The nozzles were provided with cut-offs, so that any man who finished before the rest could shut off his stream. When all had finished, each would disconnect his line from the ¾-inch main at the T, and leaving the nozzle where he had finished, would drag his hose forward 200 feet. The main lines were then rolled up and placed upon the cart, which was moved forward to a new stand. It was always managed so that the barrels were nearly empty when the cart was moved, so there was very little weight to the outfit. In this way we could take a swath 400 feet

wide, moving 200 feet at each move. I have often sprayed 3,000 trees in one day with the outfit. I am still using this system in the Stetson groves at DeLand.

While we were engaged in the fight against the white fly at Citra, Prof. H. J. Webber, of the United States Department of Agriculture, came there and tried several experiments. Among other things, he tried to introduce the parasitic fungi, but without success. The freeze of 1895 put an end to all experiments. The continual freeze-outs that followed during the succeeding four or five years made the outlook at Citra so discouraging that in 1899 I decided to accept the position at DeLand which Mr. Stetson had offered me. Not long after I had made this move, our old enemy, the white fly, made its appearance at my new location. Dr. Berger sent me some orange leaves with the white fly fungus, and asked me to introduce it by spraying. I asked Mr. Frank Stirling, now with the State Plant Board, to do the spraying, and as we looked over the leaves I noticed a brown fungus which I had never seen before. These I separated from the rest to be used by themselves. And I remarked to Mr. Stirling that if we succeeded in making this fungus take hold, it would be a good business for someone to follow. He seemed to have his doubts about it, but when, three weeks later, we looked over the sprayed trees and found that the fungus had taken hold real well, he became enthused and went into the business. In that way he helped rid many a grove of this dreaded pest. Since then I have depended almost entirely on the fungi to combat the white fly. For some time I have followed the example of Mr. W. S. Hart, letting the scale fungi control the scale as well. I find they do fully as well for the scale as the fly fungi do for the fly. In fact, the only insect pest which I have not been able to control by means of its natural enemies is the rust mite. We still spray for that, using the outfit described above.

When I took charge of the Stetson groves, their method of cultivation was to plow the groves. I had not been used to that, as our Citra groves had been simply hoed by hand. However, I made no change for a while, but watched to observe its effect. I soon decided it was not the best way to get results, so discontinued the plowing, simply mowing the groves instead. I mowed as often as the grass was high enough to cut. This I allowed to rot on the ground. As far as possible, I tried not to let it go to seed before cutting, as it rots much more quickly, and does not draw so heavily on the fertility of the soil. Before long the fruit showed a marked improvement in quality, both as to smoothness and color. The question naturally arises as to the effect of this method on the amount of fertilizer used. By comparing notes with growers who followed the custom of plowing, I found that I did not use as much fertilizer per tree as they did, and our crop was increasing in size each year. Then I began to wonder if it would not be better if the ground had never been plowed at all. About that time it became necessary to move some trees from where they had been set too thick, and I decided to plant among some pines that had not

been thinned out. Remembering my experience at Citra, I arranged to have plenty of water. I planted ten acres in this pine woods, and the trees have done well and are looking well today, notwithstanding the freeze of February 1917. Not a plow has ever been put in that grove; nothing but a mowing machine and horse rake. The latter is used to take out the pine straw so that the mower can cut the grass. The trees grow well, though it would be better if some of the pines were taken out, as they are so thick that the needles fall on the trees and have to be removed about every two years. I am satisfied that I am on the right track, and am now raising trees to set out a number of acres in the pine woods, thinning out the pines somewhat. I find that the virgin soil is looser than it ever is after it has been plowed. I plant the small trees thick in the rows and wider apart between the rows, with the intention to thin out later until they stand the same distance apart each way. I find that trees bear better when closely planted, and grow faster and are a protection to each other.

It might be of interest to some to have an account of my various experiments in the matter of frost protection. As already mentioned, my first experience in firing was during the freeze of 1876. At that time I tried to make a smudge with logs, moss, or anything that I could get to burn. But it did no good. The next thing we tried was coal tar. The way we burned this was to have a cone on legs, under which we built a small fire. Beside that we had an iron rod stuck in the ground, bent at the top to hold a bucket filled with tar. The bottom of the bucket had four holes with a slide over each, so they could be opened or closed. When the fire was started we opened these holes and let the tar drip onto the hot cone. The heat converted most of the tar into smoke, but some of it ran down into the fire and kept the latter going. But as it burned it made things hot, causing the tar to run faster. Even when the holes were closed, it would leak out and run down into the fire. By and by the rod would get hot and then the weight of the bucket would cause it to bend gracefully over until it set the bucket on the ground on the opposite side of the fire. That stopped our smudge.

Next we tried making briquettes of sawdust and rosin. They made quite a smudge, but it was necessary to knock off the soot frequently in order to keep them burning. That was not a success. We tried rosin and cotton, and had the same trouble. Then we tried pure rosin, burning it in cast iron pots. But as soon as it burned down a little the air could get to it and it would crust over and go out. I next tried making pots of paper, filling them with rosin. This did better, for the paper burned down as fast as the rosin. Thus the air had access to the rosin all the time. They burned up without going out at all.

In the 1895 freeze we used iron pots, and I made a fire out of the staves of the rosin barrels in the center of one square of four trees. These rosin-coated staves made such a blaze that at times the flames would shoot

clear through one of the trees. I remarked: "Well, that tree is done for, anyway." But one of the darkies said, "Cap'n, don't you know it's too cold to burn that tree?" Sure enough, it did not burn, and not even the water sprouts were hurt by the cold. It was the only tree that bore fruit that year. The saving of that tree convinced me that we need the heat rather than smoke.

In the spring of 1895 I read a paper before the Horticultural Society at Jacksonville in which I recommended the shedding of a portion of our groves as an insurance policy. Mr. Stetson took up my idea, and covered fifty acres of the groves at DeLand. The trees did very much better under these sheds and grew faster than those outside. But the sheds will rot down, and lumber is now so high in price that they are out of the question. Someone suggested using coke salamanders in the sheds; so I made experiments to see what they would do compared with open wood fires. We built a wood fire in one of the sheds so that the blaze went up to the roof, and also lighted a coke salamander. I found the same temperature maintained by the salamander at twice the distance as in the case of wood. So I decided on the salamanders, and have used them for a number of years with varying success. The chief reason for occasional lack of success has been not having enough of them afire at one time.

My experience in the February, 1917, freeze showed conclusively that it is simply a question of having enough stoves and enough fuel to burn at least four nights. The salamanders should be made of cast iron so they will not rust out. They should be placed closely enough together so that only one-fourth of them need be used in an ordinary cold. Then when the freeze is more severe, more can be burned. And by having so many, some can be reserved for the second, third or fourth night of an ordinary cold spell, in case it is impossible to get enough help to refill them during the day. The fuel should be distributed in bags, boxes or barrels placed conveniently near the stoves. If this is done, a very small crew of men can recharge the salamanders in a short time. With such preparation I am sure that one can safely protect his grove, even in the severest kind of a freeze. The plan is costly, I will admit, but need not be applied to the entire grove. I really think it best not to attempt to protect too large an area, for there is risk that without sufficient help to keep all well heated, the whole may be lost. I firmly believe that every grower should be prepared to save a portion of his grove, so that if the remainder is lost, he will have something to live on and not be forced to abandon it all.

Such, then, have been my experiences in nearly half a century of citrus culture. I have told my little story, and trust that now others of the old pioneers will come forward and contribute each his quota to the fund of human knowledge on this subject, which our Society is trying to store up for future generations.

DeLand, Fla.

Paper No. 3 from Committee on History.

Council of State Defense

P. H. Rolfs.

I cannot tell you how pleased I am to get away from the office work and attend the meeting in this beautiful city of Fort Myers. This splendid body of men and women have always stood for the upbuilding of the State and have been most generous in their patriotic devotion to the country. There has never been any division of opinion as to this one point. We have been united a thousand strong and will continue to be united and to prosper.

It is most fitting for the Horticultural Society to meet at Fort Myers, clothed in its wealth of tropical verdure and amid the balmy breezes enjoying the lavish luxury of a tropical island, yet not being isolated from the outside world by a watery passage. Those of us who live the year round in Florida do not fully appreciate the wonderful climate. Last January I had the opportunity of getting a real taste of what we enjoy. On the first day of the month I was in the southernmost part of the state among the mango and avocado trees, examining the bloom and the effect of some cold nights we had had. On the twelfth of that month it became necessary for me to be in St. Louis. Old Boreas was holding sway in his most violent form. Trains were blocked on account of the intense cold, it being reported in the local papers at twenty degrees below zero. Coal in plenty was on the railway cars, but owing to previous rains it was frozen into a solid block.

Traffic of all kinds was suspended, even to street cars and automobiles. Public and private houses in some cases were unable to furnish sufficient heat for the comfort of the inmates. After repeated pilgrimages to the railway station I finally secured passage back to the state of blooming mango trees.

I believe that at no time in my life was I so vividly impressed with the greatness of our country nor the importance of the State of Florida. While the north was wrapped in a mantle of ice, those who were favorably located and able to pay for them could eat tomatoes ripened in Florida. It takes adversity to bring out in strong relief the good qualities not only of a Nation but of a State.

THE BREAK.

While our Nation and our State were enjoying unparalleled prosperity and making unprecedented advances in education, science, and everything else that goes to make up a happy civilization, the most calamitous war in the history of the world broke out in Europe. For over two

years time it seemed almost certain that we would be drawn into the vortex, and in spite of our resisting to the utmost the current toward this vortex, even permitting our citizens to be ruthlessly murdered and our flag repeatedly insulted, finally human endurance broke and war was declared April 6, 1917. In spite of the fact that war had been going on in Europe for over two years, the American nation was in no sense prepared for war. The whole vast machinery of the Nation and of the States had been prepared for peace time condition. In this interim, a number of far-sighted and patriotic citizens, realizing the utterly unprepared condition of the nation and the tremendous confusion that must arise in the event of war being declared by Congress, formed themselves into various societies. Especially was this true of the scientific and philosophic associations. They gave most of their time and largely of their personal resources for war study.

COUNCIL OF DEFENSE.

On August 29, 1916, an act was approved creating a Council of National Defense. This was composed of the Secretary of War, Newton D. Baker, Chairman; Secretary of the Navy, Josephus Daniels; Secretary of the Interior, Franklin K. Lane; Secretary of Agriculture, David F. Houston; Secretary of Commerce, Wm. C. Redfield; and Secretary of Labor, Wm. P. Wilson. This Council of National Defense was assisted by advisory committees.

On April 9, 1917, Secretary Baker, Chairman of the National Council, sent a letter to the governor of all states, requesting them to form similar organizations within their borders. There are now Councils of Defense organized in 48 different states, acting either under laws by the legislature or by appointment from the Governor.

On April 30th, the Governor of Florida, Hon. Sidney J. Catts, called together at Tallahassee the heads of various organizations and societies in the State to consider the matter of better food preparedness for the State of Florida. The following composed this first commission: P. H. Rolfs, Gainesville, Dean Agr. College, Univ. of Fla.; H. H. Hume, Glen St. Mary, Pres. Fla. State Hort. So.; W. A. McRae, Tallahassee, Commissioner of Agriculture; Sen. J. L. Shepard, Greensboro, Pres. Farmers' Union; J. H. Ross, Winter Haven, Pres. Fla. Citrus Exchange; L. B. Skinner, Dunedin, Pres. Growers' & Shippers' League; W. P. Franklin, Ft. Myers, Sec. Florida First Commission; W. F. Miller, Valrico, Pres. So. Fla. Chamber Commerce; Dr. Lincoln Hulley, DeLand, Pres. State Bankers Ass'n; S. J. Triplett, St. Cloud, Acting Pres. Press Ass'n; Mrs. W. J. Jennings, Jacksonville, Pres. Federated Women's Clubs; Miss A. E. Harris, Tallahassee, Pres. Fla. State Teacher's Ass'n; W. N. Sheats, Tallahassee, Supt. Pub. Instruction; W. F. Blackman, Winter Park, Pres. Fla. Live Stock Ass'n; J. M. Burguieres, West Palm Beach; J. H. Mackey, Jacksonville, Pres. Fla. Fed. of Labor; B. L. Hamner, Norfolk, Va., Ind. Agt., S. A. L.; E. B. O'Kelley, Jacksonville, Ind. Agt. A. C. L.; J. E. Ingraham, St. Augustine, Vice Pres. F. E. C; S. W.

Westbrook, Pensacola, Ind. Agt. L. & N.; J. C. Chase, Jacksonville.

This Commission elected the Dean of the Agricultural College to the position of Chairman. For a number of weeks the work was continued, when at the urgent request of the national and other authorities the Governor assigned the duties of the Council of State Defense to the Food Preparedness Commission.

The object of the Food Preparedness Commission, as well as the Council of State Defense has been to carry out the program outlined by the Council of National Defense so far as it was physically possible to do so. The Executive Committee of the Council and the Council have had several meetings since their first appointment. Some additions have been made to the State Council, the first being Mrs. Wm. Hocker, who was at the same time made a member of the Executive Committee. She represents the Woman's Division of the State Council. At the Jacksonville meeting in February, the following names were added and notified to become members of the State Council:

Hon. Braxton Beachman, Orlando, State Food Administrator; Lloyd Josslyn, Orlando, Library Pub. Director for Fla.; A. T. Williams, Jacksonville, State Fuel Administrator; J. F. C. Griggs, Jacksonville, Dir. Nat'l War Savings Com.; G. B. Travis, Jacksonville, Dir. U. S. Employment Service; Clarence Woods, Eustis, Inspector of Explosives; Gilbert D. Leach, Leesburg, State Publicity Director; R. C. Stephens, St. Augustine, Chairman for Ret. Deliveries; C. D. Cooley, Tampa, Dir. Motion Picture Cooperation; C. A. Tutwiler, Jacksonville, Dir. of Publicity; David N. Sholtz, Daytona, Exec. Sec. Food Card Campaign; Curtis R. Kessler, Jacksonville, Dir. Four-Minute Men; W. F. McCandless, Jacksonville, State Dir. Boys Working Resv.; J. A. Williams, Tampa, State Fish Commissioner.

This gives you in outline the personnel and general organization of the Council of State Defense.

SOME OF THE STATE COUNCIL'S WORK

The last twelve months have been most profundly busy ones for everyone who has had even a spark of patriotism in his make up. There is more unselfish devotion to our country, our State and our flag today than the dreams of the wildest imagination could have pictured two years ago. People in large numbers have given life and property to the government in devotion to an unselfish ideal. At no time in the history of the world has there come about such a crystallization of the ideal and unification of interest as in the last year. This not only permeates the entire United States, but has crossed the Atlantic Ocean and saturated England, France, Italy, and even Russia. Germany, the despicable, is the only place where the monarchial ideal remains firmly entrenched. In the United States it has been a veritable crystallization of what was felt during the last ten or fifteen years. It reminds me somewhat of a supersaturated solution that is just on the point of crystallization and any little agitation, foreign agent or other extraneous element will cause the super-saturated liquid to crystallize. This has been

the case with the democratic ideal in the United States. I do not say that the war was necessary to crystallize the ideal, but it was the one cause that led to its taking permanent form.

One of the most important pieces of work accomplished by the chairman was that of aiding the National Council in its work in the State. It has been a difficult task to find men who were ready to volunteer their services and at the same time were able and willing to carry out the ends of the national government. Without this large army of volunteer civil officers the crystallization and carrying out the ideals of the Council of National Defense would have been impossible.

When we think of taking the draft of over six millions of our population and classifying them for army service, and all of this work done by civilians, we at once see that the United States has carried off one of the most stupendous pieces of work ever accomplished by any large nation. Florida has not failed in the least, and has rather stood out prominently as the one State in the Union where least trouble in this direction was encountered. It was not necessary to send an army officer or national official of any kind into the State of Florida to enroll, classify and send forward her quota of citizens to take their part in the national army. The entire work of enrolling, classifying and transmitting the classifications was all carried off by the citizens of the State without the least compensation. The draft boards were appointed by the Governor of the State but in every respect were from the civilian population. This one act, which is only a type of many that might be cited, shows how firmly the democratic ideal is grounded in American citizenship. We have every reason to be proud of what has been accomplished if nothing else were done than this one act that I have mentioned.

I have mentioned to you the one great democratic ideal that has been carried off in our State. I want to mention some lesser things with which the Council of Defense has had more direct and larger connection.

Immediately after the Commission was organized an attempt was made to look into the future and see what would probably be among the most important large pieces of work that could be done. In consultation with some of the leaders in agriculture in the State, it became evident that the labor situation was one that would become acute as soon as the dull months of the summer were passed. Immediate steps were therefore taken, and Mr. Haskell, of the United States Department of Agriculture, was secured. Mr. Haskell was engaged on a very important project in Southern Georgia, but this being an emergency call he was sent to Florida, in order that every possible effort might be made to stabilize and equalize the labor needs of the State. Mr. Haskell began his work in May. In June Mr. W. A. Dopson was appointed to work in this same capacity and with Mr. Haskell. The labor situation has not been a rosy bed of ease for those who needed to have work done. However, Mr. Dopson has outlined to you clearly what was accomplished. Unquestionably this work could not have been ac-

complished if the problem had not been grasped at the earliest date possible. It is a fine piece of work that he has done.

The second important piece of work was that of organization and preparation for the County Councils. This has not been carried out as effectively or satisfactorily as all of us would have liked to have seen it done. It has, however, pointed out clearly to nearly every county in the State that the elements are within their own borders for doing a large and proficient amount of work. In some counties the Councils have been most satisfactory and efficient. Their organization is thorough and far-reaching. The State Council has sought to bring all of the elements together in these various counties and keep the different lines of work unified and connected to the one end for which all were striving. In the county councils, whether organized or unorganized, no more important features have come in than the work of the County Demonstration Agent and Home Demonstration Agent.

Since the first of last August a fund of about $40,000 has become available from the national government for carrying on emergency demonstration work and home demonstration work. This work has been broadened and extended until every County in the State has a County Demonstration Agent and a Home Demonstration Agent. It is true that in some counties these agents are working only part time, and in other cases two or three counties are joined in a district to which an Agent gives all of his time. In addition to the County Agents and Home Demonstration Agents, urban communities have received special agents, known as Emergency Urban Agents. These women do for the households in the larger cities what the Home Demonstration Agents do for the rural population. Another enlargement in the work has been that of appointing negro agents for crop production. There are now thirteen negro men in as many different counties, and twenty negro women in as many different counties. These have been assigned to the most populous negro counties. A resume of the work they have done would make very interesting reading but not applicable to the point today.

This gives you somewhat of an outline and an idea of the needs of the Council. It needs your support. It needs your hearty co-operation. Yes, it needs more than that,—it needs your earnest thought and fervent prayer.

IN THE WAR TO WIN

We are in this war to win. It is a great big fight. It is the fight for tremendous big principles which are as far apart as the poles. There is no compromise. There is no medium ground. It is the fight of democracy against autocracy. It is the fight of a government existing for the governed against a government for which the governed exist. We are fighting for the principle that the individual is the important consideration against a government which believes that the individual exists merely for the aggrandizement and glorification of the government, where the individual counts for naught, against a system of government which teaches and believes

that there can be no such thing as national morality—that might makes right. Can you think of a more despicable situation than to have a visitor in your family, being treated with the utmost courtesy and consideration, planning and plotting how he can most easily stab you in the back and do you to death? Yet that was exactly the situation of the American government when Von Bernstof was ambassador. We have arrived at the situation where for our own safety every man must take orders without question from those higher up and execute those orders to the very best of his ability. We have come to a situation where there can be no neutral ground. Either we are American citizens or we are alien enemies. If the latter there is absolutely no place except behind prison bars.

We have endured some very serious inconveniences in the last few months in the State of Florida. Of course every effort has been made to correct those difficulties, in transportation, in purchasing material, in selling our goods. However, we have only to go to other sections of the country to see that we do well to "endure the evils that encompass us rather than fly to those that we know not of." Dr. Nathan Sanborn told me a few days ago that the New England people were notified that they need not look for any corn with which to feed their stock; that plenty of corn would be going through New England, but it would be going right by their doors to "somewhere in France;" and that if they wanted to keep up their live stock and keep up their food supply they must raise their own crops. The South has had warnings without number. When our army shall have been increased to two and a half million men on the battle field our transportation difficulties will be so great that we will look back to the spring of 1918 as an easy time.

If the present drive should break through we would find every steamship commandeered for carrying troops and food and every section of the United States taking care of itself as best it could. For Florida, no matter what happens in the future, we must look for greater difficulties in transportation.

FINALLY.

Naturally you will ask me, "well, what about it?" We are facing one of three F's. We must either *fight* or *farm* or *finance*. There is no escape from one of these three. Fighting we cannot do, otherwise we would not be assembled here. Many of us are too old to even be considered good "cannon fodder." Nearly all of us can *farm*. And every one of us can *finance*. There is no one in my hearing who could not if he so desired, buy one Thrift Stamp, every day. Nearly all of us can buy a Liberty Bond. I can remember the day when my father plowed in patched overalls, and I have seen my mother go visiting in a mended dress. I am not too proud to be their son, and am ready to wear the patches, and, in the language of Secretary McAdoo, "consider it a badge of honor."

In buying Liberty Bonds remember you are not *giving* the Government anything. You are getting more than value received. You are merely doing unto your neighbor as you would he should do. It

is the duty of every one of us to see that our neighbors do unto us are we are doing unto them.

Farming does not absolve us from financing. Farming must be carried on, and carried on by the community as a whole. There are three F's in farming that we must remember: the first is *food*, do not forget that. *Food*. The second is *feed*, and the third is *forage*. Already there is a partial embargo on the shipment of forage. If you farmers do not produce enough feed and forage for the animals on the farms, the animals are likely to go without it next winter.

In conclusion, let me recapitulate:

The three important F's are—*fighting* for the few; *farming* for the many; *financing* for everybody. For the farmer the three important F's are, *food* to feed your family; *feed* for the live stock; and *forage* or go without.

Gainesville, Fla., April, 1918.

System in the Nursery

F. M. O'Byrne.

It is said that the difference between a pessimist and an optimist may be told at the table. The pessimist will say, "Is there any milk in that pitcher?" while the optimist will say, "Please pass me the cream."

I know that the world at large hates the pessimist and loves the optimist. But of late I have found a warm place growing in my heart for the pessimist, and have almost reached the conclusion that the world would be considerably better off if we had more of them.

By what right does the optimist take it for granted that there is cream in the pitcher? Isn't the pessimist's position of inquiry much the more tenable? Moreover, his every day experience would certainly lead him to believe that if there was any dairy product in the pitcher, it would be milk rather than cream. In fact, the whole inference which one gathers from the optimist's request is misleading and colored by his desire.

I wonder if unwarranted optimism is not responsible for a great many mistakes and misstatements in life? I believe that one of our greatest faults as a people is over-optimistic belief in ourselves, our failure to duly consider, investigate, safeguard and record. Hardly a person in our country feels that this nation has made the strides in the first year of the war that he would have liked to have seen it make. We were too optimistic about what we could do, and hardly realized what slow progress was being made until the end of the year, when we all naturally began to take stock and compare our achievements with those of other nations. Perhaps if we had not been quite so optimistic all along, we would have seen some of our mistakes sooner and would have ultimately made greater speed.

We have, to a great extent, the same trouble with the nurserymen of other States. They are optimists. They have implicit faith in the ability of their inspector to find any insect pest or disease in their nursery. Many of them think it absurd that we should want a list of the shipments that they make to Florida points. Hasn't their State inspector gone over their stock carefully and pronounced it free from insect pests and diseases, they ask.

Why should we doubt the ability of their State inspector so openly? Our requirements are a discourtesy to their State inspector. We must think they have a poor lot of inspectors, etc., etc. As inspections are made annually in most

States, they evidently expect their official, while inspecting, to see all the insect pests and diseases that will get on those plants for the entire year to come. That is almost too good to be true. We aim to inspect the Florida nurseries four times per year, but we wouldn't undertake to say at any time that there were no insects or diseases undetected on the plants we pass as being apparently free, or that none would get on before our inspector would get back in ninety days. Canker came into the State on certified plants. White pine blister, rust and other pests have reached this country on certified shipments. Such accidents may happen again. Don't be optimistic and say they will not. Be pessimistic and say they will, and you will be right. We should, therefore, keep an ordinary business man's record of the shipments of nursery stock planted in the State. We have yet to have dealings with an out-of-State nursery which is willing to consider for a moment the possibility of its stock ever carrying an insect pest. Entirely too optimistic.

Many Florida nurserymen are optimists. They think they can remember a whole lot of things that even a prodigy would forget. When you try to explain a way to use certificate tags, they understand the whole thing thoroughly. But when you come to check over their tag record at the end of the year, they lack a great deal of essential information. Even then they are optimistic and give all kinds of promises to do better in the future, only to be broken speedily. This is an extremely serious matter. We don't know what nursery may become diseased, and when one does, it is of the utmost importance that we have an absolutely accurate record of all shipments which it has made. The lack of such a record has already cost us thousands. We must not make the same mistake again. Excuses for the past and promises for the future are a very poor substitute for information that we should have on file in our office. There is no need for any one failing to supply us with the information we need, providing they are only systematic in their work. That is the key to the whole thing—"System."

It is strange how careless and unsystematic most people are. How many growers know how much it costs them to raise a box of oranges; how much it costs to fertilize their crop per box; how much to cultivate it? There are undoubtedly many farmers in the State who are losing money on some crops because they don't keep any records and therefore have no idea as to what items are paying them and what are not.

The pathetic part of it is that people often think that they are very systematic when they are the reverse. Many people rush at their work rather than take it methodically, and think that they are getting more done on account of their rush. In reality they are getting less done. I wonder if I have made my meaning clear?

Did you ever watch a thin, nervous man and a very fleshy man who had the same kind of work to perform? The thin man is apt to rush around and appear to be getting a whole lot done, while the

fleshy man moves slowly and works methodically. But at the close of the day's work you are apt to find that the fleshy man has done as much or more work than the thin man, and has done it more thoroughly. He has learned to save steps.

Too many people depend entirely on their memory without any device to assist it. This is hard on the memory, and is bound to get one into trouble. One is apt to remember those things which he is most anxious to do or not to do. Many little details will be forgotten unless there is something to recall them to mind. Every business man should have a memory jogger, such as a pocket calendar, a desk pad, or even a wall calendar. When there is something that you have to do several days or weeks ahead, don't burden your memory with the matter, but make a note of it on the calendar, and the matter will be automatically called to your attention at the proper time.

When there are certain details in connection with any piece of work which are apt to be forgotten, so arrange the method of doing the work that failure to do any one step properly will be automatically called to attention by a later step. If mistakes continue, see where the weak point is, and change the method of work in such a way that you will guard against making the same mistake again.

I don't know where one can get better examples as to how to arrange a system of work to automatically guard against mistakes, errors and omissions than in the work incident to the present nursery inspection requirements.

Some will tell you that the present requirements entail such a tremendous amount of work that it is practically impossible to comply with them, and that they are so complicated that strict compliance with the rules is impossible. Others will say that they do not find the present requirements difficult or onerous in the least, and that it is no task at all to furnish us with all the required information. Both are telling the truth according to their own experiences. The difference is that the first man is unsystematic; the second man is careful and exact in his work. The size of the nursery has absolutely nothing to do with it. There are nurserymen of all sizes in each class.

As you probably know, all of the certificate tags which the Nursery Inspection Department issues are numbered. Those receiving tags are required to account for each one received by filing in the nursery inspector's office an invoice covering the shipment on which the tag was used. The unsystematic first get into trouble by failing to use their tags in numerical order. Instead, they will use them here, there and yonder. Order is the first principle of system, and as surely as a nurseryman uses tags in a hit and miss fashion, just so surely will he find it impossible to trace his records or account for all of his tags. It is the easiest thing in the world to insure the use of tags in numerical order. One has only to string the tags on a wire or cord (preferably a wire), putting the highest numbered tag on first, the next highest next, and so on down to the lowest, which is put on last. Nothing could be easier of more effective. With the tags

arranged in this fashion, just try to use them out of order. You can't do it.

In the second place, the nurseryman should make it a rule *always* to take out his invoice before he removes the tag for that shipment from the wire. This will prevent his using a tag and forgetting to make out an invoice to cover. An invoice should be made in triplicate; one copy for the customer, one for the nursery inspector's office and one for the nurseryman's record.

It is surprising how many there are who have not been in the habit of keeping any records themselves. Probably less than four per cent would keep such a record unless required to.

As some invoices are certain to get lost in the mail, it is occasionally necessary for us to call on the nurserymen for duplicates of the ones lost. Hence the necessity of the nurseryman keeping a record. For ease, he should keep his record systematically. In case he is doing a very small business, he may need only an ordinary spike file. This can be made by driving a nail through a piece of thin board. By placing the invoices on this spike file face downward in order as made, one has only to turn the file upside down and one has a record of the sales made by that nursery in chronological order, and also a record of the tags as used in their order.

In many cases the nurseryman wishes to file his copy of the invoice with the correspondence of his customer. In this case he should have another simple device to enable him to keep a record of his tags as used. We will call this a "Tag Ledger." On receipt of his tags he should record their numbers in a ledger or some such book of ruled paper (an ordinary five-cent composition book would do). He would put only one figure to the line in a column on the extreme left of the page. The entire line to the right would be left blank. When he uses a tag he should note on the line to the right of its number the name and address of the purchaser and date of sale. If desired, he could note also a list of the stocks sold. This would take the place of the "Day Book" used by many nurserymen, and has many advantages.

This arrangement was evolved by the manager of a branch of one of the larger nurseries. He finds it indispensable. By its use he is able to handle several thousand tags yearly without an error. To be most effective, the information should be noted into the tag ledger from the invoice. This will call the nurseryman's attention to any errors which may have been made in writing out the invoice.

Listing sales in the "Tag Ledger" in this manner eliminates the chance of making duplicates, for there is only one line for each number. It calls the matter to one's attention immediately when a tag is used without an invoice being made out to cover. It makes the matter of looking up information for the nursery inspector's office simplicity itself.

In making invoices, one should be systematic. Invoices should never be given in a letter, likewise a letter should never be written on an invoice. Letters go into one file in an office and invoices go into another. If a letter is written on an in-

voice, we must make a copy of it for the correspondence file. Otherwise the correspondence file will be incomplete.

Again, it is important that invoices be made out in a certain way each time, as this greatly simplifies the matter of checking them over, both for the nurseryman and our office. Moreover, a simple invoice is much easier to make out. Some people write in and make the biggest kind of a job reporting on a small sale, when all that they would need to do would be to fill out one of our uniform invoice blanks with the information called for. Experience has shown this general form of invoice to be the best.

There is very little danger of the farmer or nurseryman becoming too orderly or over-systematic. The danger is the other way. One doesn't know how often he needs records until he has them. He will be surprised how often he has to refer to them when they are available.

"But," some will say, "that is all very well for one who can afford it, but I can't. Office fixtures cost too much money." No, they don't! Office fixtures cost in proportion to their size, finish, etc. What would the average farmer need to start with, and how much would it cost? He should have a plain kitchen table. Cost, $2. This is his desk. If he is anything of a carpenter he can put a drawer in it himself. Or he can put a shelf between the legs and keep boxes on it in which would be his pencil, five-cent roll of pencil carbon paper, paper and envelopes. Then he should have a file for filing correspondence. He can use a book file if he wishes, or if his correspondence is too heavy for the book file to accommodate, he can use an orange crate, or any box of about that shape. A crate makes an ideal file. It is just the right size. A lid can be made which will protect the contents from dust and children. It can be fastened with a nail or padlock. A bundle of one hundred correspondence folders may be secured for $1.50. Get all right hand tabs. Turn twenty-five of them wrong side out and you make left hand tabs. Letter these folders A, B, C, etc. These will serve as guides and folders also. All those with whom you correspond considerably should be given an individual folder. Chance correspondents you file in the lettered file. For example: You correspond often with John Anderson. Write his name on a folder and put it back of folder "A." You write frequently to Will Andrews. Put his name on a folder and put it back of Anderson's. You write often to the Avery Tractor Co. Give it a folder back of Andrews. But you file letter from J. C. Atcheson, W. T. Allen R. T. Armstrong, from whom you hear at rare intervals, or from whom you may never expect to hear again, in folder "A." So it goes with "B," and so on through the alphabet. Under "R" you should have a folder for receipts. Put all receipts in it as received. At the end of the year take them out and tie them together, labeling them "Receipts for 1917," etc. Never throw them away. You don't know when you may need them. A couple of cigar boxes filled with shot or stones will keep the folders standing erect.

Every grower should have a number of reference books close to his desk. No

need to buy a bookcase. An orange crate turned on its side makes an excellent book case. So also an orange crate subdivided makes a splendid set of pigeonholes, which the average man thinks is so indispensable to a desk. Personally, I would disagree with him on that point, but if he wants them and will use and not disabuse them, all right. What else do you absolutely have to have in a small office? Nothing that I know of. If you want a card file, make one out of a cigar box. Your office completed and all ready for work should not cost you over $4 or $5 at the most.

When replying to a letter, make a carbon copy of your reply and attach it to the back of the letter. Place it in that individual's folder. When you get the next letter, attach your reply to its back and file it *behind* the first letter. In this way you will have a complete record of what he has said to you and what you have said to him in reply, all arranged in chronological order and instantly to hand. No looking all over the house to find a necessary and important letter.

A man may promise to give you 30 cents per bud for some trees, and you may write back and tell him he can have them for 45 cents per bud. He might write you to send them along at that price. When he comes to settle up, he may declare that you wrote him that he could have them at 35 cents per bud, and that he had ordered them on the strength of that offer. He might have been perfectly honest in misunderstanding your letter. In either case, how much would it be worth to you to have a copy of that letter of yours? In one deal you might save ten times the entire cost of your office. How often have you been called upon to pay a bill already paid and for which you have taken a receipt? If you have lost the receipt, you will probably have to pay the bill again. No chance to lose the receipt if you have just one place to put all receipts and put them there promptly. Try keeping records in this way and see how nicely it works out.

Don't depend on an overtaxed memory. Psychologists have proven that there is nothing so treacherous as one's memory. One has only to read Hugo Munsterburg's great book entitled, "On the Witness Stand," to realize that a treacherous memory is not the exception but the rule. One will remember distinctly having said thus and so to one man, when in reality he said it to someone entirely different.

The man who has actual facts and proofs at his command has a tremendous advantage over the man who is speaking merely from memory. If you would succeed and be really efficient, be systematic. "System simply means the ability to get the thing done, to get it done thoroughly, and to get it done on time. It does not mean cards and blanks, red tape and fol de rol; it means doing the task nearest to hand, doing it in season and doing it in full."

I have really not said anything about system in the nursery proper. There are volumes to be said on that subject. The average small nurseryman depends on his memory altogether as to what kind of buds he put into certain rows. He doesn't

make a note in the nursery or elsewhere. I have had them point their stock out to me time and again. It runs about like this: "Starting at the east of the block there are three and a half rows of Valencias. The south half of the fourth row are Pineapples and so are the next six rows. The next row is Lue Gim Gong and the balance are grapefruit. Often they use grapefruit and tangerine rows to separate different kinds of oranges. Nevertheless, it is very risky to depend on your memory as to what kinds of buds are in various rows. The rows should be tagged or labeled in some simple way, and a record kept in the field or the office.

Our nurseries should be more systematically planned to permit spraying. If we would learn to keep more records and do more planning, the tone of our work in the field, as well as the work in the office would be considerably improved. The stock raised would give more satisfaction and the nursery would be more profitable.

State Nursery Inspector, Gainesville, Fla.

A Performance Record, Bud Supply Department

Leo B. Scott.

I have had the pleasure of attending two of the Seminars at Gainesville, and your Society meeting at Arcadia. On all of these occasions I urged you to standardize your fruit crops, to eliminate many of your worthless citrus varieties, and to develop a few which would be known as standard Florida products. Today, if you will permit me, I want to urge the same thing, and also to tell you of some of the new developments along these lines which are taking place in your rival citrus producing State—California.

At the Seminar in October, 1916, a committee of representative growers and nurserymen recommended that the following short list of varieties be developed as the standard round oranges for Florida: These varieties, in order of ripening, were the Parson Brown, Homosassa, Pineapple, Valencia and Lue. The committee's report was accepted by the Seminar. This action marked an important step forward in your horticultural development.

It must not be assumed from this action of the committee that new varieties will not be found which may prove superior to existing ones. However, no new varieties should be introduced and propagated extensively commercially unless they have some distinct outer characteristic or trade mark, and some internal characteristic, such as thinness of skin, color of flesh, or high dessert quality, which makes the new kinds distinctly superior to any of the standard varieties.

During 1916-1917 my associate, Mr. E. D. Vosbury, was stationed in Florida. The major part of his duties was to have been the securing of records on the behavior of the different citrus varieties and assisting growers in inaugurating individual tree performance record work in their orchards.

Records were started on about three thousand acres of citrus trees in various parts of the State. Then came the freeze of February, 1917. In many groves the fruit was frozen and growers deemed the records would be of little value. For this reason much of the work was abandoned. Later on we entered the war with Germany, and Mr. Vosbury, like many other patriotic men, felt his duty was at the front. He entered the Second Officers' Reserve Training Camp at Fort Myer, Virginia, was commissioned first lieutenant in the signal corps of the aviation section, and is now somewhere in France.

It was not easy to secure a competent man to take Mr. Vosbury's place. I had to spend considerable time in Washington and have not been able to devote as much

time to the field work in Florida as I would like. However, events are now shaping themselves so that we, probably next fall, will be able to transfer a man familiar with the California situation to Florida.

We are especially anxious to get information concerning grapefruit. You will note that the committee in recommending orange varieties very diplomatically refrained from any mention of grapefruit. The grapefruit situation is even more difficult of solution than the orange one. You have many varieties, all have distinguishing characteristics but the differences are not as marked as is the case with oranges. Your leading varieties are Marsh, Silver Cluster, Walters, Duncan and McCarthy, yet if I were to take a vote here today and attempt to find out which was the best variety, I am afraid the votes would be distributed evenly among the five. Tangelos are also assuming importance as commercial fruits. Where they are planted in any quantities, records should be secured on the individual trees to determine which varieties are best suited to the different sections. Much of this work can be done by the growers themselves, but we hope to locate detailed study plots in all five of these grapefruit, and some of the tangelo varieties, in three or four different localities in the State, where our representatives will secure not only records of the total amount of fruits produced by each tree, but will also find out the different sizes of fruit produced, the amount of fruit in each size, and the relative seed content of average fruits. Through a co-operative arrangement with another project leader in the office of Horticultural and Pomological Investigations, information concerning the behavior of the different varieties in ordinary and cold storage will be obtained. We hope the information which will thus be secured can be used as a basis for action with your grapefruit varieties, similar to that which you have already taken with oranges.

Fortunately, many of the growers who commenced securing individual tree records two years ago, in spite of the many obstacles, have continued their records. Some have secured records for at least three years. I am not now going to take up your time with descriptions of methods of tree numbering, blanks which are used, and methods of obtaining tree records. All this information was presented by me at the Arcadia meeting, and was published in the proceedings of the 1916 meeting of the Florida State Horticultural Society. If there are any persons here who desire information concerning performance records, I will be very glad to meet you and answer your questions. You will find complete information on these points in Farmers' Bulletin No. 794, Citrus Fruit Improvement, How to Secure and Use Tree Performance Records. This bulletin can be obtained from the United States Department of Agriculture on request. I do want to tell you, however, that the statements which I have made many times concerning the presence of drone trees in your orchards are being verified by these actual records. Growers who are securing individual tree records are finding in some orchards many trees

which are shy bearers, or, if they are bearing any fruit, it is of poor quality. This condition, they find, is consistent from year to year. The different strains which we have found in the Valencia variety in California have been duplicated right here in Florida. What do you know about your orchard? What do you know about your individual trees? You owe it to yourself and to the Florida citrus industry to have every tree in your orchard producing a maximum crop of high quality fruit of a standard variety. You should locate your worthless trees and topwork them with budwood cut from performance record trees. You will ask, "Where can I get the budwood?" That leads up to the real message I want to bring you, and that is to tell you what your rival, California, is doing in this respect.

Last spring a department in the supply company of the California Fruit Growers' Exchange, known as the Bud Supply Department, was formed. This department was created because of recognition of the fact that in all the California orchards there were many trees which did not produce typical fruits of their leading varieties, and that in order to improve the standard of the whole output of the State, it was necessary to improve and standardize the output of each grove. The service was not limited to Exchange members, but has been operated as a public service proposition. Buds were furnished nurserymen and growers from record trees at a cost of three cents a bud for Exchange members and three and a half cents a bud for non-members. It might be further stated that not all the budwood is cut in Exchange orchards. One large independent company operating 1,500 acres, who has been securing individual tree records for six years, has turned all these records over to the Bud Supply Department. The grower is paid two and a half cents per bud, and the other half cent goes to the Supply Department for maintenance charges. Budwood is only cut from fruit-bearing wood with the fruit attached. This is done as an additional safeguard for the purchaser. Our investigations have shown that even in the standard trees limb variations are found, and the only way one can be sure that undesirable variations are not being propagated is to cut the budwood with the fruit attached.

During the first six months after the Bud Supply Department was established 100,000 record buds were cut and sold. So far this spring 107,000 buds have been sold, and additional orders have been taken, so that the total deliveries this year will run over 300,000. This showing, too, was made during one of the most disastrous crop years in California's history.

The question then arises, "Can the Florida grower purchase budwood in California?" The answer is "No," and the reason is the quarantine which exists against the importation into Florida from California of citrus budwood in any quantities, except for experimental purposes.

One Florida nurseryman tried to buy eight thousand record buds, but his request had to be refused.

Another very important duty which this Department performs is to assist growers in securing individual tree rec-

ords in their own groves. Representatives of the Department go to the man's grove, help him number his trees, show him how to record the data from each tree, and, in fact, assist him in installing a "Babcock test," if you please, on his trees.

The need for such a public service department is acute here in Florida. You are recovering from two severe winters. You have learned many expensive but valuable lessons. Some sites you have found are too cold for citrus, others need some form of frost protection every year. The result will be, though working temporary hardship to many, that eventually a bigger and better citrus industry will develop in this State. Should you not begin to take steps to safeguard the development of this industry? It is true you have relatively few performance record trees at the present time, but you have enough so that they can be used as a start. The main thing which you need is a responsible organization to handle the securing of the budwood for growers and nurserymen. This service should be open to every person interested in citrus growing in the whole State.

Before coming to this meeting I conferred with Professor Rolfs and Professor Newell, at Gainesville, and with some of the officials of the Florida Citrus Exchange. All these gentlemen agree that the logical place for such a department in Florida is under the direction of the Florida State Agricultural Experiment Station. It, therefore, rests with you growers whether or not you desire to have such a department started. We are going to keep working and talking until we see this brought about. I have every confidence in the Florida citrus industry. You have made wonderful advancement in the past; you will make still more wonderful advancement in the future. You are making progress in eliminating many of your worthless varieties. Your next step is to make every tree within these varieties produce typical standard fruit. You need some stable organization which can superintend the securing of record budwood for your nurserymen and growers. The Department of Agriculture stands ready to assist in starting such an organization.

Pomologist, U. S. D. A., Washington, D. C.

Irrigation Problems in the Fort Myers Section of Florida

F. W. Stanley.

Mr. Floyd has kindly asked me to prepare a paper for this Society, presenting particularly the irrigation problems in this vicinity and along the shores of the lake.

The problem of irrigating citrus groves around Fort Myers is probably about the simplest in the State. Two natural features cause this—first, flowing wells of large capacity, and second, a soil that will allow carrying water for relatively long distances by means of open ditches. There are a number of citrus sections that have the so-called hardpan that prevails in this section, making open irrigation ditches practicable, but the addition of flowing wells is seldom found very far from the coast or along the larger rivers of the State.

There are a great many groves irrigated in this section that would be benefited if the main open irrigation ditches were abandoned and sewer pipe with tightly cemented joints was substituted. Large pipe is a necessity when water is carried from flowing wells, as loss of head from friction must be kept down to a minimum; open ditches in this class of soil also cause decided over-irrigation along the ditch, and a corresponding waste of water.

The subject of salt-glazed clay pipe (sewer pipe) for use in grove irrigation has been discussed in such detail, both in the Horticultural Society meetings and in government bulletins, that details of construction can be easily obtained, either by consulting past records of this Society or by writing to the U. S. Department of Agriculture for Department Bulletin No. 462 and Farmers' Bulletin No. 899.

Mr. S. C. Warner, of Palatka, and Mr. F. C. Wyman, of Bradentown, use sewer pipe systems connected to flowing wells, and can vouch for their success. But generally speaking, irrigation of citrus groves in Florida is mostly a matter of insurance, and he who can insure against loss from drought at the least cost is getting the most from his investment.

The irrigation of the muck lands along the lake is a problem that has presented itself since the drainage ditches have lowered the water level in the upper glades. Many farmers have suffered loss from drought in recent years upon farms that were overflowed land a few years ago. Some of the farmers have erected overhead irrigation systems, which have been more or less successful, but the high cost

of installation and operation for these make other methods necessary.

It has been shown that if the ground water can be controlled, much of the everglade land can produce many crops abundantly. This water level must be kept neither too low nor too high, and the same level is not required for all crops and for all soils. Engineers have presented plans for controlling the level of the ground water by locks and dams in the main canals, but at the present time these have not been carried out with great success. The varying level of the glades as a whole, and the variation in kinds of crops, present difficulties for such wholesale irrigation, and the difference in level of individual farms will become still greater as cultivation goes on. The settling of drained and cultivated muck soils is continual and often alarming.

Surface irrigation from low-lift pumps of large capacity has been practiced with success on several portions of the glades, and some such method will probably be extensively developed in the future. In most cases there is abundance of water to be obtained from the canals and at low lifts. It will seem strange to many that light muck soils can be irrigated by running water down furrows, but if water is pumped in large enough quantities, no great difficulties will be encountered. If water can not be transported in furrows, the water level of the tract usually can be raised by filling parallel ditches with water, these ditches being placed from ten to fifty feet apart. In most cases no piping would be needed, open ditches being used entirely.

There are a number of low-lift pumps that are comparatively cheap. The Menge pump, made in New Orleans, is very cheap for lifts up to eight feet, and will deliver large quantities of water. There are a number of low-lift centrifugals adapted for such work, which are comparatively low-priced. For power, kerosene or heavy oil engines will be advisable for glade conditions.

These irrigation plants can be reversed and used for drainage, if the farms are dyked, and many drainage pumps can be used for irrigation.

In conclusion, I would like to make a plea for the low-priced surface irrigation plant for the truck growers. Thousands of acres of vegetables of all kinds can easily be irrigated by furrow irrigation, using vitrified clay pipe for the distribution systems. These systems bear no relation to sub-irrigation systems whatsoever. The sewer pipe is used instead of iron pipe where the pressure is kept down.

The following well-known orange growers can give details of such systems: L. B. Skinner, Dunedin; S. C. Warner, Palatka; F. G. Sampson, Boardman; Richard Lake, Clearwater; F. C. Wyman, Bradentown, and Edward Jones, Miami, Florida.

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New and Rare Plants for Florida Gardens

H. Nehrling.

"One never knows until one tries." This old saying comes constantly into my mind when I read in my sets of "The Gardener's Chronicle," "The Garden," "Garden and Forest,""Die Gartenflora," "Die Gartenwelt," the "Revue Horticole," and other gardening papers and in my books on travels and beautiful tropical plants. I have experimented largely with many plants during the past ten years, and I am surprised how many of the tropical jewels survive our rather disappointing winters, and how many flower and attain a large size. I am unable at this time to mention all the plants that are doing well, and especially those that assumed large sizes during six or seven winters, when we had no killing freezes. I shall list only a few which have proved very beautiful and valuable additions to our garden flora.

Podocarpus Nagei. This is a most beautiful dense evergreen coniferous tree from southern Japan and the Island of Formosa. A specimen in my high pineland garden does not do very well, but on moist flat-wood soil it is a grand success. The late Mr. Edmund H. Hart of Federal Point, a man with an unlimited love and enthusiasm for exotic plants set out a specimen about thirty years ago, which has developed into one of the most exquisite trees in the State. It is now a tree about 35 feet high, pryamidal in form, very dense and of a deep-green color, showing, in the young foliage, glaucous and slightly violet lines. The coloring and its dense growth and exquisite beauty impressed my mind so deeply that the picture will never fade from my memory. The tree was somewhat mutilated as some of the lower drooping branches had been cut away by a careless colored laborer, but even as it was the specimen was a picture of unique and exquisite beauty. I have never seen a more refined and a nobler coniferous tree. It grows on very rich moist black soil near the St. Johns river. In fact the soil is so moist that it had to be ditched all around. It is perfectly hardy all over Florida.

Araucaria Bidwillii. Bunya-Bunya. Australian Monkey Puzzle. This is by no means a new tree, but it is extremely rare in our gardens. With a little protection it is hardy as far north as Jacksonville. Mr. C. D. Mills of that city sent me a photograph of his fine specimen growing in the open. It has the benefit of rather high buildings towards the north and west. The finest, and noblest specimen, however, is found in the Carpenter garden of Orlando, where also some tall specimens of tree ferns (Alsophila aus-

tralis) can be seen. It was planted about fourteen years ago and is now about 40 feet high and about as much in diameter near the ground. The form of the tree, which is very dense and covered from top to bottom with the glossy dark-green, sharply pointed leaves, is pyramidal, the lower limbs gracefully drooping to the ground, the central ones more horizontal. The glossy dark-green color and the extreme dense massiveness combine to make this tree a picture of unrivaled beauty. This Araucaria stands on rich, black, well drained soil. It has never been injured by frost, though it comes from such a tropical country as Northern Australia. Unfortunately a number of other trees occupy the soil close to it and in this way detract from its beauty. It needs room and desires no close neighbors. Only as an isolated specimen that can be admired from all sides, Araucaria Bidwillii is one of our most important and valuable tropical trees.

Cecropia Palmata. Palmate Cecropia. Before the killing freeze of February, 1917, I had three very large and healthy specimens of this Cecropia. They had attained a height of 40 feet in six years, and the girth of the largest specimen was 33 inches near the ground. They were killed to the ground, but sprouted again vigorously. As the foliage is crowded near the extremities of the big branches several specimens ought to be planted together. They should be about 15 feet apart. The leaves remind one somewhat of the castor plant, but they are much more beautiful and very much larger. They are very long-stalked, deep green above and silvery white beneath. When the wind moves the masses of foliage the contrast of the deep green and silvery white is very striking. The flowers, in form hand-shaped, appeared in great numbers. Their color was creamy white and they were very interesting. As I had only female plants, the fruits did not ripen. A friend of mine who had seen this species in the West Indies and in Panama, its native home, said that he had never seen such large and beautiful specimens there. This Cecropia does not naturally grow dense. There are only a number of large boughs, and the large palmate leaves are clustered at their ends. The trunk contains a sweetish milky sap, and the sap suckers on their way northward usually girdle the big boughs with circles of holes.

Ficus Nymphaefolia. Water-lily-leaved Rubber Tree. About thirty years ago I received from Haaget Schmidt, Erfurt, Germany, a most beautiful rubber tree under the above name. I planted it out in my high pine land garden and the specimen last year had attained a height of 30 feet with a dense and most beautiful crown. It is a jewel amongst tropical evergreen trees. The leaves are very large and their form reminds one of some of the water lilies. They are so glossy that they appear as if they had been varnished. The species is, however, a very tender one. A few degrees of cold kill the beautiful leaves, and in drying and curling up they exhale a most delicious tonka bean fragrance. This Ficus is a most valuable tree for south Florida, say south of Punta Gorda. It requires rich soil and it grows as well on light pineland as in the moist flatwoods

and in hammock soil. I had a fine collection of rubber trees prior to the freeze of February, 1917, and there were large specimens of the common rubber tree (Ficus elastica) and of the large leaved Ficus pandurata in Orlando but all were killed outright by a temperature falling as low as 20°F.

Ficus Pandurata. This large-leaved rubber tree is one of the finest and most massive of all tropical trees. It was brought to this country about fifteen years ago by Henry A. Dreer of Philadelphia. Being a native of Kamerun, West Africa, it is very tender and can only be planted successfully in extreme south Florida. There are some fine and very large fruiting specimens at Fort Myers. The leaves are densely clustered on the many branches. They are fiddle-shaped or banjo-shaped and over a foot long and of a dark glossy green color.

Ficus Altissima. This Indian species, much more beautiful and elegant and much more graceful than F. elastica, should be planted in all ornamental gardens of south Florida, where fine tropical show trees are appreciated. It requires much room for its full development. There is a most beautiful specimen with an immense broad crown in Mrs. McAdoo's garden at Punta Gorda, which annually bears its bright red fruit, in size like a cherry and relished by the birds.

Ficus Retusa. (*F. nitida*) The "Cuban Laurel." Not, however, a laurel and not a native of Cuba but of tropical Asia and Malaya. The dense foliage is small, of a very delightful green, and the tree is one of the most beautiful that can be imagined. There is a fine dense specimen in one of the gardens at Punta Gorda. It is rare, but it should be planted largely in south Florida as an avenue tree and in ornamental grounds. I have planted all these species and many others in my new garden at Naples-on-the-Gulf. I have there *F. rubiginosa* (F. australis), another rather small-leaved species from Australia; *F. macrophylla*, according to Ferdinand von Mueller, perhaps the grandest of Australian avenue trees; *F. afzelli* of tropical *Africa; F. palmata* (?) and *F. padifolia*, a new and most beautiful species, introduced by the Bureau of Plant Industry of Washington, through Mr. Carlos Werckle from Costa Rica. Mr. Werckle says that "this is very different from the rest of the genus in its being of superb form. It is a very large and very dense tree of exceptionally beautiful color, and is evergreen. Nearly all the other species are bare for a longer or shorter time during the dry season. Very much liked by birds and always full of little parrots. Fruit and leaves very small. One of the most beautiful tropical trees." I have two small promising plants of this species.

Couroupita Guianensis. Cannon-ball Tree. A fine tropical tree with large evergreen leaves and clusters of large pinkish-white flowers. The large cannon-ball shaped fruits, very hard shelled and of a grayish brown color, hang down from the trunk and main boughs. Though a native of Guiana it is perfectly hardy in extreme south Florida. There is a fine large fruiting specimen in the grounds of the Royal Palm Hotel at Fort

Myers. The species was introduced by Reasoner Bros. many years ago.

Mr. John Soar, Little River, Florida, has a very large and dense live oak in his grounds which is a veritable air garden overgrown with hundreds of orchids, bromeliads, ferns and cacti. It is a sight to see and worthy of a long journey to admire it. This epiphytal growth reminds one of a fairy scene and should be imitated wherever these plants are hardy. I cannot refrain from giving a list of the epiphytes growing on this live oak.

Orchids: Epidendrum Tampense; E. anceps; E. rigidum; E. nocturnum; E. cochleatum; E. sp., species from Bahamas; E. Boothianum; E. sp.; Oncidium luridum; O. luridum, var.; O. spathelatum; Polystachya luteola; Macradenia lutescens; Cyrtopodium punctatum; Dendrobium nobile; Cattleya Trianae; Vanilla planifolia; V. Eggersii.

Bromeliads: Catopsis nutans; C. sp.; Billbergia sp.; Guzmania monostachya; Hohenbergia pendulata; Tillandsia usneoides; T. caespitosa; T. utriculata; T. bracteata; and three other unidentified species of Tillandsia

Ferns: Polypodium incanum; P. aureum.

Aroids: Pothos aurea.

Cacti: Cereus grandiflorus; C. nycticalus; C. triangularis.

Other Plants: Peperomia magnolifolia; P. leptostachya; Thunbergia alba.

Most of the plants are natives. There are hundreds of fine foliaged and beautiful flowering Bromeliads from the West Indies, Mexico and Central America, Brazil and the Andes that can be grown very successfully on the trunks and large limbs of live oaks, such as the many species of Aechmea, Caragnata, Guzmania, Billbergia, Tillandsia, Nidularium, and Vriesea. I am now experimenting largely with these Bromeliads and also with Aroids. The Bromeliads will thrive on rough bark trees in south Florida. They should be made quite as much a specialty as orchids. I am sure any one getting a collection of these together will reap as much pleasure from them as from orchids; and perhaps more so, for the majority are exceedingly ornamental even when not in flower. We have about fifteen to twenty wild species in the State, all exceedingly interesting plants, and many of them very beautiful. Even the man not particularly interested in plants is struck by the beauty, size, symmetry and gracefulness of the "Wild Pines" or "Air Plants," found particularly in rich hammock woods and in cypress swamps, nestled upon the trunks or thick boughs of the trees. In many cases whole limbs are covered with dense masses of young seedlings. The large growing species like *Tillandsia utriculata*, *T. aloifolia* and *Catopsis nutans* are frequently collected and sold as curiosities to northern tourists. Though highly interesting as graceful and handsome plants, many of the tropical species outrival our native species in beauty and stateliness by far. The leaves of many of the tropical species are highly colored, red, yellow, white, blackish, and brown. Their form quite frequently is vase-like, holding water in the center, which again collects parts of old leaves and particularly insects which form part of the nourishment of the plant. All of them are epiphytes growing on the

trunks of forest trees, and some are found on rocks.

A large representative collection which I received from the Garfield Park Conservatories at Chicago, Ill., many of them not to be had in duplicates, was destroyed by the Florida Plant Board—a body that makes every scientific research in acclimatizing new and rare tropical plants impossible. Previous to the rulings of this wise body of men, I had received a collection of Bromeliads from other sources and from the Bureau of Plant Industry in Washington. These invariably did well and some species formed large clumps within a few years. I can only mention a few of the very best: *Nidularium amazonicum* with vasiform, brownish-green leaf-rosettes; *N. Innocentii,* with leaves more or less tinged with brown; *N. fulgens,* with light green leaves which are spotted with darker green; *N. spectabilis,* a very beautiful species, which stands the cold here at Gotha. The leaves are green, tinged with brown and marbled on the back with transverse bands of reddish-brown; each leaf is tipped with bright red. *Cryptanthus zonatus,* a beautiful small foliage plant, bright emerald green, beautifully cross-barred with brownish-white; *C. Beuckeri* and *C. bivittatus,* also fine small foliage plants. *Aechmea fulgens* with bright green leaves, and its variety *A. fulgens discolor,* with bright claret brown all over the lower surface; *A. Weilbachii, A. miniata* and its variety *discolor* with deep red leaves on its lower surface; *A. aurantiaca, A. Mariae-Reginae,* a large and beautiful plant; and many others. The genus consists of about 150 distinct species, all of them very beautiful. *Billbergia vittata, B. thrysoidea, B. zebrina, B. speciosa, B. Morelii, B. mutans, B. Porteana,* and others have all proved hardy here in ordinary winters. All are epiphytes and can be grown on trees. *Caraguata luiguata* and its variety *cardinalis* with bright red leaves; *C. musaica* with a beautiful rosette of green leaves, banded copiously on the back with fine wavy lines of red-brown on a purple tinted green ground. *Guzmania tricolor* and its form *variegata,* found wild in extreme south Florida. The genus *Tillandsia* is well represented in Florida by quite a number of species. The gem of the gems is *T. Lindenii* with its beautiful blue flowers. There are about 250 different species found in tropical America. *Vriesea carinata* (*V. brachystachys*) is a gorgeous flowering plant with dazzling red bracts remaining long in good condition; it flowers in winter; *V. splendens,* a rather tender species, with leaves of a bright green color, distinctly marked with cross-bands of purplish-black; *V. psittaciana; V. tessellata,* and *V. fenestralis* with beautiful red, green, and yellowish striped and cross-banded or tessellated leaves; *V. heiroglyphica* with large band-like leaves, cross-barred with deep purplish-black; *V. Sandersii* (*Euchiolirion Sanndersii*) has beautiful glaucous green leaves, spotted with claret-brown on the back. All come from tropical America, and are easily established on large shady trees in south Florida. I have grown most of my plants very successfully in pots. The pot should be filled up to one-third with pot-shreds and the compost used is fibrous

peat, some fern roots, charcoal, leaf mold and sphagnum moss. Mr. Theo. L. Mead has succeeded in naturalizing the beautiful little *Tillandsia ionantha* from Mexico in his woods. It is one of the pigmies of the family. As the family consists of about 1,000 distinct species and almost all of them are interesting, it is not an easy task to supply a satisfactory list. I have fastened most of the species I have in my collection to the trunks of cabbage palmettoes on my new place at Naples, and all are doing well.

Gotha, Fla.

Sweet Peas in Florida

Mrs. R. D. Hoyt.

Some twenty years ago we had a short row of sweet peas that bore a few fine blossoms, but not enough to encourage planting them again.

I recall that the man we had working for us at the time, and who had worked for florists in the North, said that the soil was too poor. No further attempt was made to grow them until about four years ago, when a friend living in Tampa sent us a small bunch of sweet peas at Christmas time. The flowers were small and the stems short, but the fragrance was so delightful that we resolved to try to grow some the following winter. Accordingly seed was secured from a Northern seedsman, and in early October the ground was made ready and the seed planted.

In the preparation of the ground we followed the instructions given on the seed packet, and planted in good heavy black soil on the edge of a drained pond. A deep trench was made, and a plentiful supply of well-rotted stable manure was put in. There were two rows about thirty feet long. In due time the seeds sprouted and the little plants pushed their way up, but at the same time a great quantity of nut grass came up. It took a lot of time and patience to weed the nut grass, and I know it would not have been done so thoroughly but for the aid of a friend who spends the winter at our home. He kept at it until the nut grass was done away with. The vines grew off well, and after a time bamboo tops were stuck along the rows for them to cling to.

During the Christmas holidays the friend in Tampa who had given us the flowers the year before came for a visit, and when she learned what sort of seed we had planted, she discouraged us greatly by saying the plants would never set any flowers; that only the winter blooming varieties would blossom here. We had planted the kind usually planted throughout the North. We felt so discouraged that very little was done to the plants until February, when Mr. John Lewis Childs visited at our home. Early next morning after his arrival he was taken to the garden to give his opinion on the prospect. During the interval since our friend's visit the vines had grown splendidly. As soon as Mr. Childs had seen them, he assured us we would have plenty of blossoms when the time came, not earlier than April. Encouraged by his opinion, an application of commercial fertilizer was made. About the first week in April we picked the first blossoms and very soon flowers were abundant. The vines grew to the height of eight feet

and more. We have a kodak picture of our daughter standing on a step ladder picking the blossoms. The flowers were of good size and the stems long, and we continued to pick them in profusion until in June. Visitors were amazed at the height of the vines and the wealth of flowers, with such varieties of color. A visitor who was over six feet tall could just reach the topmost flowers.

In October we prepared another trench, this time planting the winter-blooming varieties. These began to blossom in December, while the vines were still quite small. By the middle of January we were getting plenty of flowers, very fragrant but with shorter stems than the other variety. These vines grew to be about five feet high, and we had quantities of flowers for the next three months.

We planted again in the fall, but the cold weather in February, 1917, hurt the vines so badly that we got no more flowers that season.

We feel that we have demonstrated that sweet peas can be grown here in South Florida, but last fall we decided not to attempt to grow anything just for pleasure that required so much attention.

Clearwater, Fla.

The Use of Chayotes and Dasheens and Their Culture

J. E. Morrow.

I wish to assure you of the pleasure of being with you this day and being permitted to say a few words to you on this very important subject, "The Use of Chayotes and Dasheens and Their Culture."

We must ask ourselves first "Why so much agitation over food questions?" The answer leads us back to the all-consuming topic of the great war of aggression being made on civilization by the forces of "Hun-tocracy." We hear from across the waters of the Atlantic the cry for food raised by the millions in devastated France, Belgium, Poland, Serbia and Armenia, where populations have been in places almost exterminated by the desolation wrought by a barbarous military machine, which for extreme cruelty has never been exceeded by the savage Indian or a Malay pirate. We must remember that, at the head of this machine, stands that merciless military force of Prussia, directed by the Kaiser, who claims to be an ally of God, but whose actions proclaim him to be the advance agent of Satan. It is this force and this creature which would drag our civilization down to the very low level now held by German kultur.

The wanton destruction of homes, the absorption of food supplies or its destruction for war purposes, the lack of production because of labor shortage and adverse climatic conditions, have produced a shortage of foods in a wider area, perhaps, than ever known before by civilized man.

Our government has done and is now doing everything possible to alleviate this suffering, and to rescue from death by starvation those who have not already passed out of an existence most miserable, brought about by this so-called Kaiser kultur. In order to assist this starving, robbed, beaten and maltreated people, our government has seen fit in its wisdom to give without stint from our abundant food supplies, such amounts as could be transported. But the scarcity of ships has been a limiting factor, and we know, too, how this scarcity of ships was brought about.

Our railroads have been over-burdened with the enormous amount of shipping entailed in the transport of war supplies. This at times has prevented the shipping into our own communities of sugar, flour and other commodities. Therefore, while we are economizing in foods, we should also economize in matters pertaining to

transportation. Each community should, in just so far as possible at this time, learn to be self-sustaining. Produce your own food; study your food ration as you do that of your stock; cast off the cloak of conservatism which you have worn too long in this matter and look about you for food other than grits and white meat; utilize other foods that God in His wisdom has created for you.

Two foods not so commonly used as they should be are the Chayote and the Dasheen. Both are adapted to extensive cultivation in this balmy State. The Chayote was first brought to the speaker's attention at Santa Ana, California, in 1905. It was then known as Sechium edule. It seems to have secured a footing in the coastal counties in Southern California, also in Louisiana, where it has been under cultivation for some time under the name of Mirliton. From present indications it is capable of a very extensive cultivation from the coast counties of Texas, into Louisiana, Mississippi, Alabama, Florida, Georgia and South Carolina. It may be possible to extend its cultivation beyond these limits as we become more expert in its propagation and culture. The plant is a climbing one, having a perennial root system which, if protected from frost, moles and excessive flooding, will produce fruits for a number of years. The vine annually makes a very vigorous and rapid growth, that somewhat resembles that of a pole cucumber. But it is a far more rampant grower, climbing, when permitted, into trees, fences, trellises or anything with which it may come into contact. On well drained, rich soils the plant is extremely precocious and prolific.

At the U. S. Plant Introduction Field Station, Brooksville, Florida, last year's plants were frozen to the ground November 25th; the roots were then covered with a hay mulch. Early this spring, when the vines started growth, the mulch was removed and a heavy application of dairy manure applied and hoed in. The soil was well ridged to allow water to drain off. Many of these plants have made a growth of ten feet in length, and on April 12th of this year the first fruits were gathered and shipped to Washington. A second picking was made on the 17th of April. One vine was photographed having fifty-five fruits, large and small. These were splendid fruits, being smooth, with little or no corrugation, green in color and very tender. Many other vines are making records nearly as good as this one.

The plants are easily propagated, as the mature fruits may be held over winter in cool, dry places. In the early spring, the large flat single seed sprouts and begins to grow, living upon the nutrition in the fruit until planted. These may then be potted up and allowed to grow in pots until weather conditions permit outdoor planting. This is usually the latter part of February or early March. The plants can be protected during cold spells by hay, soil, dried grasses, leaves or sacks. The covering should be removed after the cold has passed. Quite often after the vine has made a growth of six to eight feet, it starts blooming, staminate flowers appearing first and the pistillate ones later.

After pollination, if food and moisture are abundantly present in the soil, the young fruits make a rapid growth, some attaining two pounds in weight when fully matured. They are best for cooking purposes when two-thirds grown. They have a tender touch to one's skin at that time. The fully matured fruits become hard and lose much of their quality with age.

They are cooked in different ways. The writer's wife has prepared them from forty-one distinct recipes, and we have found them good in all. They are especially delicious when creamed or used in salad, fritters, sauce, or in stews or sweet pickles.

The vine should bear from spring to November or December, or whenever killing frost occurs. Just previous to frost, a liberal supply of good, smooth, pear-shaped fruits should be gathered and laid aside for use as seed during the following spring, to replace the old plants if they should be killed.

In field planting, one should have four furrows thrown together and well ridged. The fruits or plants (preferably the latter) are then planted on the ridge ten or fifteen feet apart in the row. The rows should be at least ten feet apart. The plants can be trained from the ground to the arbor or trellis above on bamboo poles whose sprigs have not been cut. A good type of arbor is the one made in the shape of a large T. These are easily constructed by using 4x4x10 pieces of cypress or heart pine, setting them in the soil so that about seven feet are above the ground; a piece of 2x4, five feet long, is nailed at the top. A series of these may be used about fifteen feet apart in the rows. Four wires stretched over these lengthwise will provide room for the vine to spread, and will place the fruits where they can be easily gathered, and at the same time give plenty of room for horse cultivation.

The vines should be gone over at least once each week and trained on to the wires. The fruits should be gathered at least twice each week during harvest season to prevent their becoming old and tough and sprouting on the vine, as they will do at times. The best fruits are to be had during the spring or early summer and in the fall when the summer heat has passed.

The mid-summer fruits, at times, lack the quality and delicate flavor of the fruits grown earlier or later. The summer rain, followed by the scalding sunlight, does great damage to vine and crop at that period.

The worst enemies of the Chayote are the wilt, the brown aphis, the melon or pickle worm, the ground mole and the Nematode. Wilt is best combated by planting on high, well-drained soil and providing good drainage. Brown aphis can be controlled with Black Leaf 40. The pickle worm may receive the same treatment or the fruits liberally sprayed with lead arsenate or Paris green.

The mole which kills plants by burrowing around the roots for worms may be trapped or fed poisoned peanuts. The Nematode is now under investigation at the Station (U. S. Plant Introduction

Field Station, Brooksville, Fla.) by Mr. L. P. Byars.

The supply of fruits for Northern market purposes is entirely inadequate. There has been more of a demand created than can be supplied. It is such a splendid vegetable for home use that it should be found in every Florida garden in which it can be grown. Any waste fruits of the Chayote are readily eaten by stock and poultry.

Efficient fertilizers for the Chayote are dairy manure, hardwood ashes and nitrate of soda.

Mr. Nathan Menderson, formerly connected with the U. S. D. A. Bureau of Plant Industry, Office of Foreign Seed and Plant Introduction, Washington, D. C., has done some work on the Chayote at the Brooksville station. For information or literature concerning the Chayote, address Mr. R. A. Young, in care of the U. S. Department of Agriculture, Washington, D. C., or the U. S. D. A. Plant Introduction Field Station, Brooksville, Fla.

The Dasheen.—In speaking to you of the Dasheen, I am talking of a vegetable perhaps more generally known than the Chayote. The first home of the Chayote was probably Central America, where it now abounds; while the Dasheen is to be found largely disseminated throughout the tropical world, where it is used as one of the main articles of diet by millions of people.

Mr. R. A. Young, of the Office of Foreign Seed and Plant Introduction, Washington, D. C., has been laboring scientifically and efficiently for a number of years, in the introduction, propagation, selection and distribution of this wonderful vegetable which has such great possibilities.

Those of you who have not done so should get out your year book of the U. S. Department of Agriculture for the year 1916 and read the article written therein by Mr. Young. You will then have a very good working knowledge of the Dasheen.

The Dasheen is a selection of Taro imported into this country from Trinidad, and is fast taking its place throughout the South as a crop that must be given consideration by every farmer who desires an abundance of cheap, excellent food for his family, for the market and for his stock. Horses, cows, hogs, chickens and dogs all eat it with relish when cooked. In speaking with a prosperous and progressive farmer of Brooksville, recently, who had grown an acre of Dasheens last year and who, after selling the best shaped tubers on the market, fed the remainder to his stock, I was advised that he had planted more than an acre this year. He fattened twenty head of hogs on Dasheens and a pasture of rape. The butcher who bought the hogs was so well pleased that he endeavored to engage the farmer's hogs that would be for sale next winter. This family used the Dasheen regularly every day on the table, and had become very fond of them. The good woman of the house informed me that she had fed nothing but boiled Dasheens to her laying hens for several months, and had secured excellent results. The farmer had saved several hundred dollars' worth of corn.

which he was selling, and had used a substitute food with good success.

The man referred to is Mr. O. P. Wernicke, of Brooksville. Another who is using the Dasheen is Dr. H. G. Bystra, of the same place. Dr. Bystra cultivated several acres of Dasheens last year, selling the best of the edible tubers to a New York firm and keeping the other grades for home use for table and for his chickens, hogs and dogs, of which he has quite a number. He has quite an acreage planted this season, and is very enthusiastic over the Dasheen as a source of good strong, energizing food.

To obtain best results in Florida, the land should be deeply plowed in January or February, and, if possible, cross-plowed and disked. The rows may be laid off with a small scooter plow and cross-checked with the same 3½x3½ or 4x3 feet. The seed used should be carefully selected tubers or corms dropped in the hole left by the plow in checking, and covered about three inches deep with a hoe. The young plants should show above ground about one month from planting. As soon as they can be well seen, horse cultivation should begin and be continued at intervals of about every two weeks until August 1, the soil being gradually worked to the plant until they are well bedded. Hand cultivation is frequently necessary to keep down the weeds close to the plant. A five-tooth cultivator will do for the first two or three times, after which the last tooth should be removed and a ten-inch sweep used in its place, as this will clean the land better and work the soil to the plant. The last cultivation is usually made about August 1st. At that time all weeds are cultivated out and the soil thrown to the plant with a middle breaker, leaving a good water furrow for drainage.

During the latter part of September or early October the leaves turn yellow, indicating maturity. Digging begins in the last of October or early November, and it may be done by hand with shovels or potato hooks. If the land is clear of roots and stumps, they may be plowed out. The tops or leaves may then be broken off and the corms and tubers allowed to dry for a day or so, after which the roots are removed, the corms and small side corms separated and the edible tubers graded out from seed and second grade tubers. It is quite essential that the grading be carefully and conscientiously done, that the poorer material may be placed in a grade by itself. It may be utilized as stock food or sold at a lesser price than that received for first grade corms and selected tubers.

The material is now ready for storage for shipment. It should be stored in a cool, well ventilated place, where there is an absence of very low or high temperatures.

Shipment should be made in barrels (lime, apple, sugar or flour barrels), which have holes bored in the sides near the top and bottom, for ventilation during warm weather.

In excessively cold weather, when the thermometer drops below freezing, no shipments should be attempted; or, if made, the barrels should be well lined with paper.

The stored product should be looked over carefully at intervals, and any decayed material removed. When stored at a proper temperature, they can be held for months. There is now quite a demand in the Northern cities for the Dasheen.

There are many varieties of the Dasheen now under test at the Brooksville Station. Two of these varieties are the Pat Long Fu and the "White Sprout."

The Pat Long Fu (red and white Taro in Chinese) is a variety of exceptional quality, and makes splendid crisps or chips. It is very fine when baked and yields a very good flour.

The White Sprout is a new variety of very fine wnite flesh, and, because of this, is a possibility for utilization in making Dasheen flour. Dasheen flour, not having gluten, is used with wheat flour at the rate of one pound of Dasheen to three of wheat.

Another use of the Dasheen is in forcing the corms for shoots. These shoots are more tender than asparagus and have a very delicate flavor.

In conclusion, I would say that in order to have food and have it more abundantly —good, palatable, easily digested, nourishing food—one should grow the Dasheen.

Plant Introduction Field Station, Brooksville, Fla.

DISCUSSION.

Mr. Reasoner: My brother grew them (the Chayotes) thirty years ago. It is an admirable vegetable for a small place. One or two vines will cover the whole lot.

We did not plant the whole fruit; we saved nothing but the germ and a small piece of the flesh, and put them in the kitchen; and when after a few days a number accumulated, we put them in the greenhouse in flower pots, and after the weather got warm, planted them out. They grow in a small area.

Mr. Skinner: I have one of them. It covers a telephone pole and runs along the telephone wire for a hundred and fifty feet, with fruits hanging all the way on the vine. My experience has been that they must have water and plenty of it; and still, if they are not on a rich soil, they don't do well. I had four Chayotes sent me. For three of them I appropriated the flower garden and they took possession all right; the fourth one I put in the back yard and it did not get water and did not do much.

Mr. Morrow: It is true, as Mr. —— says; you can cut off the end and plant it and the plant will grow. I have done it.

We tried planting them close together, and found that was insufficient; it was better to give them at least fifteen feet. We have had them run to the top of trees fifty or sixty feet.

There is a fungus disease which affects them which is not so easily controlled, but we hope to find a remedy soon.

Mr. Hart: Back in the early 80's we used to take them and set them into a glass of water on the window sill. They would put out roots and spread out and start to grow. We then set them out.

Mr. Morrow: They are capable of being propagated in large quantities along the coast of Texas, Louisiana, Georgia, Mississippi, Alabama, and as far north as Charleston, S. C. And possibly when we know more about it, it may grow farther north still.

Some Features of Tomato, Eggplant and Pepper Culture

C. D. Sherbakoff.

Every grower of eggplant, tomatoes and peppers fully appreciates the importance in the culture of these, as well as of all other crops, of proper land preparation, proper time and method of planting, good fertilization, cultivation, harvesting, and other similar factors. Also, nobody doubts the importance of the weather and market conditions. However, many growers do not yet realize that there are certain other factors in the production of these crops which may, under certain conditions, greatly limit their culture.

These factors are the various diseases of the plants. It is not my object here to describe the different diseases of tomatoes, eggplants and peppers, and give detailed instructions how to control them, though some of these will be mentioned. The purpose of this paper is to present to you a discussion of the plant culture from a point of view similar to that from which a board of health views human diseases. In other words, we shall discuss the matter from the standpoint of plant sanitation.

Before going into a detailed discussion of plant sanitation, it seems desirable to first state certain of the fundamental facts upon which it is based.

1. No parasitic disease can develop in the absence of the parasite. This fact is self-evident. It therefore follows that the plants should be kept free from parasites.

2. Certain conditions are inducive to an increased spread of the parasitic diseases and the damage caused by them. It appears, for instance, that soil acidity is favorable for the development of the bacterial blight of tomatoes and other related crops. Repeated growth of the same or related crops on the same soil usually leads to the accumulation of the diseases. Surplus of moisture in surface layer of the soil increases danger from the Rhizoctonia and Buckeye Fruit Rot of tomatoes, while shortage of water in the soil often leads to a more or less considerable development of Blossom End Rot of tomatoes, and so forth. Such conditions should, whenever possible, be avoided.

3. Our virgin soils are free from nearly all micro-organisms that cause important diseases of tomatoes, eggplant, peppers and many other cultivated plants. This explains the fact that the growers in any newly settled district are usually not troubled with the diseases; and that in early days the plants were, in general, free of them.

4. There are many different ways in

which the various diseases are introduced into a new district. The most common and important is by planting disease contaminated seed and plants. They are also introduced by insects, wind, implements, soil, water, men and animals.

5. Many of the parasites when present are capable of remaining in a virulent stage in the soil and on old plant remnants for a considerable time.

6. Many of the parasites attack only certain plants. Thus the fungus *Phomopsis vexans* attacks eggplants but does not attack either tomatoes or peppers. The fungus *Cercospora capcici* attacks only peppers, while the Buckeye Rot fungus attacks only tomatoes. The host range of some other diseases is much wider. Thus bacterial blight attacks eggplants, tomatoes and several other plants. No truck crop is free from the Root Knot.

With the above fundamental facts in mind, we will take up a discussion of particular instances where sanitation principles should be applied. For convenience we may start with sanitation as applied to the seed.

THE SEED.

There are several diseases that are more or less commonly carried by seed of tomatoes, eggplants and peppers. Of these there are the Fusarial Wilt of Tomato, Phomopsis Foot and Fruit Rot of eggplants, and the bacterial canker-like leaf spots of peppers. Since seed can carry diseases, it is evident that the matter of having them free from such contamination is of extreme importance. All that is needed to achieve this end is to secure the seed grown under sanitary conditions. So far as tomatoes, eggplants and peppers are concerned, the following procedure is suggested as a means to obtain disease-free seed: 1. Mark some plants in the field that are of the best type, heavy yielders and perfectly healthy. 2. From these plants pick only the best and fully mature fruits that are free from any spot or rot. Break off the calyxes and bring the fruit into a house which is located preferably some distance from any field that is affected with the disease. 3. Soak the fruit in a 1:1000 solution of corrosive sublimate for half an hour and then extract the seed in any manner suitable for the purpose. 4. Thoroughly dry the extracted seed, preferably in the sun. During the drying they should be protected against any dust. Store them in air-tight jars. To keep the air in the jars dry, place a small amount of bleaching powder (chloride of lime) in each jar. If there is any danger from insects, treat the seed with carbon bisulphide.

SEED BED.

After disease-free seed is secured, the next step is sanitation of the crops in the seed bed.

All growers are familiar with damping off. This disease is caused by certain fungi. If the seed and the soil are free from them, there will be no damping off. New soils are either entirely free from these fungi or only slightly infected with them. It will be necessary to care for the seed beds made in these soils only to prevent spreading of the fungi. Plenty of light and good aeration of the young

plants near the soil is essential in keeping down the trouble.

In cases where the soil is considerably infected with damping off fungi, it will be best to sterilize it either with steam or formalin; the former is by all means preferable. But sanitation of the seed bed soil is of greater necessity than merely to keep down the damping off fungi. If the same soil is used for a seed bed year after year, it becomes contaminated with many other diseases that do especial damage to plants in the field. Among such diseases, I need mention only bacterial blight of tomatoes, Phomopsis of eggplants and Cercospora of peppers. These diseases will very often begin their attack of the plants when they are in the seed bed; but at this stage they are usually not conspicuous. When such affected plants are transplanted to the field, they produce nothing and contaminate the other plants, which otherwise would be healthy. On account of this, nothing in the way of plant sanitation can be more urgently suggested to the growers than that of keeping their seed bed soil free from the parasites. To this end, either use a new soil every year for the seed bed or sterilize it as suggested in connection with the damping off.

THE FIELD.

Under ordinary conditions and under a continuous growing of the same crops on the land, the accumulation of the different plant diseases goes on in the same way as in the seed bed soil. Therefore, methods of soil sanitation in the field are also of importance, though they are by necessity different from those applicable to seed bed soil. Thus neither the selection of a new soil nor soil sterilization are at present practicable methods. Proper crop rotation and keeping the field free from the rubbish of old plants are the only practical methods of field sanitation that have been developed.

What I have stated in regard to seed, seed bed and field sanitation is based mainly on the fact of seed and soil contamination with the parasites. Other important factors should also be considered. Under present methods of commercial plant production, the plants, as a rule, are badly affected with various diseases, and are, therefore, not safe to use. Owing to this, it is better for the growers to grow their own plants.

Then, as already stated, there are certain conditions which are inducive to an increased spread of the disease organisms and damage caused by them. One should plainly understand these conditions, and whenever practicable avoid them. In general, it may be stated that a lack of proper aeration is one of the most common and important conditions of this kind. Its effect is especially noticeable in case of the early blight, a disease otherwise known as French rust, nail head rust, etc., of tomatoes. The development of this disease on the lower East Coast is especially illustrative. There one can plainly see that the fields near the coast are not as much affected with the disease as the fields under similar conditions, but located further inland. The difference is that the fields nearer the coast have better air drainage.

The effect of the air drainage on the development of plant diseases has been observed by other pathologists, for instance in connection with black rot of grapes in the region of the Great Lakes. When natural air drainage is poor, then the grower should either artificially improve it or lay especial stress on other methods of plant protection against the diseases. In case of the tomato crop, air drainage is of special importance because of the two things; one, that early blight, the most common and usually most troublesome disease of this crop, thrives, even during a dry season, especially well under a condition of poor air drainage; and the other, that tomato plants form a very dense mass, which is naturally poorly aerated within. Pruning and staking of the plant will greatly improve these conditions. Staking is also of considerable service for protection of the tomato fruits against attack by the Rhizoctonia and Buckeye fruit rots.

The other important factor inducive to increased damage from diseases is the soil condition. From the author's observations and experiments he believes that bacterial blight of tomatoes, eggplants and other related plants is greatly affected by soil conditions. Just what conditions are responsible for the checking of this disease, he is not in a position to state definitely; yet it appears that the presence of lime in the soil in sufficient amount may be one of the main factors.

The fact of common introduction of plant diseases with the seed has already been called to attention. The danger of using commercial plants has also been mentioned. There are other important ways by which the diseases are introduced and spread. They were briefly mentioned at the beginning of this paper.

Wind Dissemination of Diseases.—Of those spread in this manner, the early blight of tomatoes and Cercospora of peppers may be mentioned. Spraying of the plants in the seed bed and in the field with a good fungicide is the only known method of protection against this method of spread of diseases, and freshly-made Bordeaux Mixture is, to all evidences, the best substance for the purpose. To be economical and efficient the operation must be timely, thorough, and done with a good power sprayer provided with first-class nozzles. As a rule, tomatoes should always be sprayed. The operation is often necessary also for peppers and eggplants.

Many important plant diseases are spread by insects, and their role here may well be compared to that in the spread of human diseases by the flies and mosquitoes. It always is a good policy to keep in check the different insects working on plants. Methods of insect control are described in Bulletin 134 of the Florida Agricultural Experiment Station, or information may be had by inquiring at the Department of Entomology of that Station, or the U. S. Department of Agriculture. Among the diseases of the plants in which we are at present interested, and which are spread by insects, we may mention here bacterial blight of tomatoes, Phomopsis of eggplants, bacterial leaf spot of peppers and soft fruit rot of tomatoes and peppers.

Spreading of the diseases by contaminated farm tools and implements and by man himself is by no means an unimportant factor, and some sanitary precautions along these lines are to be strongly recommended. Thorough spraying or washing of the tools and implements, and also of the man's hands and shoes, working animals' feet and so forth, with a good disinfectant each time the work is started in a new field, or even once every day, would be by no means a useless procedure; and if properly arranged, neither too expensive nor too troublesome. In any case, this is what we are coming to.

Finally, among the methods of plant sanitation we should not forget the importance of the immediate destruction of all diseased material, and of keeping the seed beds and the fields perfectly free from old plant rubbish.

Crop rotation as a sanitary measure has already been referred to. The crop rotation should be such as to include a succession of the plants not susceptible to the same diseases. Thus, in case of bacterial blight of tomatoes, it would do no good to rotate this crop with eggplants or Irish potatoes, because these plants are subject to the blight. But when tomatoes were affected with Buckeye Fruit Rot, eggplants, peppers or Irish potatoes are apparently safe to plant. Generally speaking, though, it is best to rotate with crops that are as little related to each other as possible. Crop rotation is often objected to on the ground that in a given locality only a certain crop or crops are profitable to grow. As a rule, this contention is not quite correct. Besides, there are some instances when it is plain that certain crops cannot be grown profitably unless the soil is freed from these diseases. In such instances, when a proper crop rotation is the only measure that can do the work, it must be followed, even if we much dislike it.

Summary of sanitary conditions of tomato, eggplant and pepper crop production:

1. Obtain seed from selected healthy, plants and fruits, and extract the seed from them under sanitary conditions.

2. Locate the seed bed on a new soil, or sterilize the soil either with steam or formaldehyde. Give the plants in the seed bed as much air and light as possible. Spray them frequently with a weak Bordeaux Mixture.

In the field, rotate tomatoes, eggplants and peppers with other crops not related to these plants. Spray them with Bordeaux Mixture once a week or every other week. When in danger from Rhizoctonia and Buckeye Fruit Rot, prune and stake the tomatoes. Keep the various insects in check. Destroy all diseased material and old plants.

Disinfect the tools, implements, etc., especially before starting work in a new field.

Gainesville, Fla.

The Popular Pepper and How to Produce It

John Boring.

Peppers are aptly said to be Lee County's most popular vegetable. Frankly, it must be confessed that in some respects they, quite like a certain class of people, owe their popularity, not to their own intrinsic value, but to the money there is to be gotten from them. And like these same people, the bigger and greener they are, the easier it is to get the money.

First of all we have a climate well adapted to the growing of peppers during twelve months in the year. Next we have an admirable soil for them. These are both most essential features.

SELECTION OF LAND FOR PEPPERS.

In selecting land one should be careful and choose the best soil possible. The land should have plenty of humus in it, and this humus should be well rotted so as not to cause the land to dry out. Also, the land should be of such character as to hold moisture. I have found that peppers on fine sandy land will stand more drought and more cold than on coarse sand. Stiff black clay is not good for peppers.

PREPARATION OF LAND FOR PLANTING.

The land should be plowed six weeks before time for setting out plants. If there is much grass it should be mowed down, allowed to lie several days, then turned under with a plow. Afterward, when the grass commences to come up, run a harrow over the land often enough to keep the young grass down. By so doing you will not disturb the grass plowed under, and by the time you are ready to set peppers, the grass is well rotted and there is a good lot of humus in the soil.

If the land is wet and you have irrigation it is best to plow your land up in beds about 21 feet across; then plow up small beds on top of the large beds, four feet apart. This will give five rows to the bed. The water furrow will take care of the rain water; also, hold the water when you irrigate and allow it to soak through the beds. It is best not to allow the water to get too close to the plants, especially artesian water.

SEED BED.

The first seed should be sowed about the 20th of July. Continue to sow more seed every ten days. By so doing you will have fresh plants to set when you want them. For the seed bed select a good moist piece of land. Plow it so as to get it above water in case you have heavy rains. After removing all grass and trash, pulverize the soil thoroughly.

When the land is in good condition, scatter some good fertilizer over the top and rake it in. Sow seed about one half inch deep and roll the land well. Keep the seed bed moist all the time. After the plants are up, never let it get dry; if you do the sun will heat the soil and the plants will burn off at the top of the ground. After the plants are an inch high, scatter some air slacked lime over them. This has a tendency to keep the insects off and the plants healthy.

SETTING PLANTS.

The land should be well prepared, having no grass in the rows. Scatter about 400 or 500 lbs. of fertilizer per acre about three days before setting. After the plants have commenced to grow and put on fruit, add from 800 to 1,200 lbs. of fertilizer per acre. That amount will bring the plants well into bearing and through several pickings. After that, there should be added 300 to 400 lbs. of fertilizer per acre every four weeks, except in cold weather. The peppers should be picked once a week and never allowed to get too old. When the fruit begins to get red the plant will stop bearing. After they have passed the cold I find it is best to give them a good plowing and fertilizing, being careful not to plow too deep.

PROTECTING AGAINST INSECTS.

If there are cut worms in the soil, it is a good idea to make a mixture of shorts, Paris Green and sweetened water, and scatter it over the ground late in the afternoon about three days before setting the plants. By so doing you will save much replanting. Should you place poison after the plants are set, be careful not to allow the dope to touch the plants as the poison will burn them off. If a spray for insects is needed, use an insecticide.

YIELD.

If your plants are out in time and you are ready to ship when the Northern market is open, they should, with good cultivation, fertilizing, and proper care, yield from 300 to 600 crates, containing one and three fifths bushels per crate to the acre.

County Demonstration Agent, Ft. Myers, Fla.

Peaches in Florida

AN EXPERIENCE

B. E. Stall.

The peach industry does not occupy as important a place among the money crops of Florida as it should. Nor is the crop as generally grown for home use as it should be. Certainly there is not a fruit which is more desirable for shipment or for home use. I consider it to be one of the best paying crops we have.

My experience has been confined to the past twenty years time, and to the growing of them on one type of soil only. The soil is a light sandy one with a yellow subsoil. Some of it is without hardpan. On these, I have been able to raise good peaches and to secure good yields.

While I know that peaches on plum stock do well in some Florida soils, they have not done well with us. In fact trees on peach stock bear more for us in four years than those on plum stock in several times that number of years.

We prefer new land for peaches, and excepting the San Jose scale, have had no trouble with them. Spraying with a good oil emulsion preferably during the dormant season, has been our best protection from that scale.

If peaches are set in the middles of the squares when planting an orange grove and are given good care, they will pay all expenses of bringing the grove into bearing. They will come into bearing in less than a year and a half after setting.

Our trees have not been bothered by the root knot or nematode where we have planted on new land and have kept peas out of the orchard. Where the trees have died, it has always been from some injury to the top and not to the roots.

The Peen-to type seems to be best adapted for here (Hillsboro County), the Jewel, Waldo and Angel being the favorite varieties.

I hope we may see this fine fruit more generally grown through the State. I feel it will prove satisfactory in every way if it is well cared for. It should not be forgotten that a peach tree needs to be cultivated thoroughly and in practically the same manner as an orange grove.

R. F. D. 1, Tampa, Fla.

Peaches, Plums and Pecans

Jasper C. Carter.

My subject embraces peaches, plums and pecans, but as Mr. Stall, of Tampa, will treat the matter of peaches, I will confine myself to plums and pecans.

I will not attempt to speak for the entire state, but give my experience and observation for the section of country with which I am most conversant, i. e., South Florida. When I was a small boy—just after the Seminole Indians had been pushed further South, the old Indian villages in our section were plainly marked by small orchards of plums, haws, and some other such fruits. The plums were generally of the very sour kind, but occasionally there were found among them a kind slightly larger, yellow in color, and quite pleasant in flavor. These were called Sweet Plums, to distinguish from the ordinary, and we knew no other name for them. Later, when nurseries began propagating plums in our state it was found that some of these wild plums were meritorious, and were improved, given classified names, and now we do not recognize them as the Indian plums of our childhood.

When Japanese varieties were first introduced, we were much enthused over the prospect of commercial orchards paying large dividends; but, alas! by the time we got them fruiting along came our enemies, short crops, no crops, etc., dampening our ardor to such extent that we tried to eradicate our plums, only to find that in this we had a job even harder than the growing of the orchard.

That there are a few plums worthy of a place in our variety orchard we will not attempt to deny; but from a commercial standpoint, we do not think it advisable to plant any that we now know.

The Excelsior has proven, in my section, about the most profitable and surest bearer of any we have tested.

The Kelsey, which I consider the very finest ever grown when thoroughly ripe and free from insects, is such a shy bearer that I have long since become disgusted with it.

The sour, or Hog Plum is too well known to need mention, and too sour to be allowed in decent society, yet when properly manipulated by scalding, drainage, squeezing and other devices known to our well informed housewives, it can be made into a very fine condiment, as preserves, jam, jelly and marmalade

Pecans, or improved hickory nuts, have never attained any great degree of success in South Florida except in rare, isolated cases. I once took up the subject, and thinking they were hardy, free from insects (same as a wild hickory) decided that to plant an orchard of them, give them care for a few years, my fortune

would be made. I procured what was then considered the finest budded varieties to be had, planted them in land that seemed peculiarly adapted to them, as it was a mixture betwen pine and hammock, clay subsoil and well drained The young trees lived well, but never grew to any appreciable extent. That was about twenty years ago, and they have not yet made a pound of nuts.

After setting my orchard I chanced to get hold of a Government bulletin treating the subject of pecans, and to my surprise found no less than forty-two different insects and diseases attacking them, so that my illusion about their being free from such was dispelled. About twelve years ago Prof. Gossard, writing on this subject gave what he denominated "An Entomological Calendar for the Pecan," in which he names its enemies for each and every month of the year; so that instead of being immune from insects and diseases, it has its full quota, and we are forced to conclude that, "there is no excellency without labor."

In my county—Pasco—thousands of good dollars have been spent pursuing the pecan phantom, and I have yet to learn of a single clear dollar in profit having been made from them. One concern, operated by some of our most up-to-date horticulturists, about twelve years ago set an orchard of about six hundred and forty acres near me. I have been watching this particular enterprise with no little interest, but have been disappointed in it just as in my own venture. I do not believe they have harvested a pound of nuts from this orchard yet. I will not try to explain all enemies and draw-backs, but am giving facts as I have seen them, and trust some of our horticultural friends in other parts of the state may be able to give a better report than this. I am chagrined that I have to appear so pessimistic as I have in this short paper, my nature being the opposite; but I deem it no less a crime to induce people to spend their money in a business which we know is failure, than it would be to take it from their purse when they were not looking.

Dade City, Fla.

Necrology

The attention of this committee has been called to the names of the following members of the Society who have passed away since the last annual meeting. There have doubtless been other losses to the Society by the grim destroyer which have not come to the notice of this committee. As the membership of the Society is large and scattered, it is difficult to get information concerning these. If such have occurred, this committe asks the indulgence of the Society for not reporting them. Respectfully submitted,

E. S. HUBBARD,
EDGAR A. WRIGHT,
Committee on Necrology.

MR. GEORGE T. CLARK, Fruitland Park, Fla.

Mr. Clark was a member of the committee on "Pruning in the Citrus Grove," to report at this meeting. The committee has been unable to obtain a sketch of his life work.

MR. J. M. MUNYON, Palm Beach, Fla.

Mr. Munyon, originator of Munyon's Homeopathic Remedies, was a member of this Society and spent his winters at Palm Beach, Fla. He is survived by a son, Hon. Duke Munyon. The committee has been unable to obtain a sketch of Mr. Munyon's life.

MR. E. H. HAYWARD.

Mr. E. H. Hayward, of DeLand, Fla., died February 5, 1918, after a few weeks' illness. He was born in Ashby, Mass., July 9, 1833, and was a lineal descendant of Peregrine White, first child of the pilgrims born in New England. Seeking a milder climate, he with his wife came to DeLand, Florida, in 1889, where he engaged in the nursery business and in real estate and insurance. In 1910 he sold the latter business and turned his whole attention to horticulture. With the outdoor life of this sunny clime, his health improved and his life doubtless was prolonged. He loved his adopted home in the Southland, being assured that he could never again stand the rigors of the New England climate, although he visited his home State occasionally in the summer. He was surprisingly active and vigorous, both in mind and body, for a man of his years. He was known to be an honorable, upright business man, and was a well beloved citizen, always interested in the welfare of the city. He was a cultured Christian gentleman. Such a one is sadly missed.

HON. HERBERT S. GRAVES.

Hon. Herbert S. Graves died at his home in Gainesville on April 20, 1918, after a brief illness.

Mr. Graves was a native of the State of Illinois, having been reared in the city of Marengo, and was a graduate of the college located in that city. He came to the city of Gainesville in 1885, and has been located there since that date. For many years he has been engaged in conducting a large and successful nursery, which has acquired a wide reputation for the high standard of its products and the expert knowledge of its owner.

In 1908 he was elected a member of the City Council, and in 1910 was re-elected for a second term. At the end of the second term he declined to seek re-election. In 1917, at the urgent solicitation of his many friends, he again successfully offered himself for election, and had just completed one-half of his term of office.

In his public life he was earnest and industrious, and ever solicitous of the needs and interests of his people. The handsome vote with which his candidacy was invariably endorsed attested their appreciation of his efforts.

Possessed of a serene temperament, he never lacked poise in discussion, and being devoid of prejudice or malice, his conclusions with respect to the public interests were always directed toward the public welfare. He had no spites to promote and no enemies to punish.

Necessarily, he was admired and esteemed by everyone.

Annual Reports

REPORT OF AUDITING COMMITTEE

Ft. Myers, Fla., April 25, 1918.

Your Auditing Committee has carefully audited the financial reports of the Secretary and Treasurer, comparing vouchers with all items of expenditure, and find them correct as reported.

J. A. STEVENS, *Chairman.*

REPORT OF RETIRING SECRETARY WILLIAMS

Cash Account to Feb. 6, 1918:

Receipts.

1917—	
April 23—Cash from West Palm Beach meeting	$136.00
Sept. 24—Check from W. S. Hart, favor Pepper Printing Co.	21.75
1918—	
Feb. 6—Received for reports sold to date	63.00
	$220.75

Disbursements.

1917—	
May 15—Paid Remington Typewriter Co.	$ 1.35
June 12—Cost of telegram March 27	.55
July 17—Postage, E. O. Painter Printing Co.	60.41
Aug. 6—A. C. L. R. R., freight on Reports from DeLand	.87
Aug. 28—Paid Pepper Printing Co.	21.75
1918—	
Feb. 6—E. O. Painter Fertilizer Co., postage to date	8.80
Feb. 6—Check herewith, favor W. S. Hart, Treasurer	127.02
	$220.75

REPORT OF SECRETARY FLOYD

Cash Account to April 25, 1918:

Receipts.

1918—	
April 25—1918 membership fees	$753.00
April 25—Back reports sold	20.00
April 1—Interest on bank deposits	.25
	$773.25

Disbursements.

1917—	
Dec. 5—Pepper Publishing Co., receipt blanks	$ 6.50
1918—	
Jan. 5—Pepper Publishing Co., letter inserts	9.00
April 10—Refund of membership fee	1.00
April 25—Lloyd S. Tenny, printing of special programs	2.00
April 25—Miss Cushman traveling expenses	23.00
April 25—To Treasurer Hart	731.75
	$773.25

REPORT OF TREASURER

Cash Account to April 25, 1918:

Receipts.

1918—	
April 21—Balance in treasury	$ 26.50
April 22—Membership fee H. W. Goodwin	1.00
April 22—Membership fee Geo. E. Mendell	1.00
April 25—From Secretary B. F. Floyd	731.75
	$760.25

Disbursements.

1918—	
April 23—To Secretary Floyd	$ 3.00
April 25—To Secretary Floyd	141.08
April 25—Balance in treasury	616.17
	$760.25

Report of Executive Committee

MINUTES OF EXECUTIVE COMMITTEE MEETING

At the meeting of the Executive Committee held on April 17th, the following members were present: Messrs. Rolfs, Hume, Hart and Secretary Williams.

The question of the number of reports to be published was discussed, and on motion of Mr. Hart, 1,000 copies were ordered printed.

There being no further business, the meeting adjourned.

MINUTES OF EXECUTIVE COMMITTEE MEETING

At the meeting of the Executive Committee held on February 7, 1918, in Jacksonville, the following members were present: Messrs. Rolfs, Hume, Floyd and Hubbard by proxy.

Two resolutions were offered and passed. The first was:

Resolved, First, That the Florida Grower Publishing Company is hereby authorized to make the combination offer of a 1918 annual membership in the Florida State Horticultural Society and a year's subscription to the Florida Grower for the sum of two dollars ($2.00), providing that one dollar of said sum is paid to the Secretary of the Society for said membership dues, a receipt taken from him for same and furnished the subscriber as evidence of membership in the Society.

Second, That the sum of seventy-five ($75.00) dollars be paid by the Treasurer of this Society to the Florida Grower Publishing Company to cover cost of postage and stationery in conection with the advertising campaign as described by Mr. Russell Kay, advertising manager of the Florida Grower, in a letter to B. F. Floyd under date of December 5, 1917.

The second resolution was:

"That the publications of the Florida State Horticultural Society be issued four times a year, in January, April, July and October; that the report of the proceedings of the annual meeting of the Society be published in the July number, and that the Secretary of the Society shall edit the publications and have same printed."

The report of the retiring Secretary and her check for $127.02 in favor of Mr. W. S. Hart were received. The check was ordered to be forwarded to the Treasurer.

The date for holding the annual meeting of the Society was discussed and set at April 23 to 26.

There being no further business, the meeting adjourned.

MINUTES OF EXECUTIVE COMMITTEE MEETING

At a meeting of the Executive Committee held in Fort Myers on April 25, 1918, the following members were present: Messrs. Rolfs, Hume, Floyd, Hart and Tenny.

The question of the number of reports to be published was discussed. On motion of Mr. Tenny, the number of reports to be published was left to the discretion of the Secretary, the number not to exceed 1,200.

There being no further business, the meeting adjourned.

Report of the Committee on History

The Committee on History wishes at this time only to outline its aims and to ask for the assistance of those who alone can make it work a success—the pioneers.

There are three branches of our work. First, the strictly historical side. How did the sweet orange come to Florida? Where were the first sweet orange trees grown in the State? Where were the first budded orange trees grown in the State? Where is the oldest grove in the State? When was it planted? Surely, of the dozen or so groves which claim to be the oldest there is one which really is the oldest of all.

Second, matters of practical interest to the present generation, such as methods of transportation in the early days, early methods of picking, grading and packing, the origin of varieties, etc.

Finally, and probably most important, information gleaned through years of experience. Many older growers know an orange tree in a way that the younger growers will not know it for many, many years. They do things to a tree that some of us would expect to be instantly fatal. For example, Mr. Sampson's method of moving large bearing trees and Mr. Steven's way of firing with rosin.

These and many other extremely interesting points are brought out in papers which have already been written for the committee. Three of these papers are herewith submitted for publication.

We are totally dependent on the orange growers of years of experience for the material we need. The idea of such a committee is a splendid one, and if properly carried out will be very beneficial to horticulturists of the future.

Will the older members not come forward and help us over the top? Write the committee a paper giving your experiences; refer us to others who can give valuable information.

F. M. O'Byrne, *Chairman.*

Election of Officers

On Thurday evening, April 25, 1918, the following officers were elected for the year January 1, 1919, to December 31, 1919:

President—H. Harold Hume.

Vice-Presidents—L. B. Skinner, W. J. Krome and S. F. Poole.

Secretary—Bayard F. Floyd.

Treasurer—W. S. Hart.

Executive Committee—P. H. Rolfs, E. S. Hubbard and Loyd S. Tenny.

Selection of Next Meeting Place

Invitations for the next meeting were received from Lakeland and Orlando. Orlando was selected to be the next meeting place.

Final Resolutions

The following final resolutions were presented by the committee consisting of W. J. Ellsworth, chairman; S. F. Poole and S. F. Williams, and adopted by the Society:

"That the Florida State Horticultural Society expresses its sincere appreciation of the generous hospitality extended its membership by the citizens of Fort Myers;

"That it is especially indebted to the live Board of Trade for providing headquarters, meeting places and delightful auto rides through the environs of the city and the beautiful groves and wonderful truck farms of the surrounding country;

"That it thanks Mr. John Boring, of Fort Myers, for his earnest labors in behalf of the Society, and especially for adding more than one hundred new members to the membership of the Society;

"That it is indebted to the Music Club of Fort Myers for the delightful and pleasing selections rendered at the sessions; to Mr. Theo. L. Meade, of Oveido, and others for the beautiful flowers and plants used in decorating the stage to the officers of the Society for their efficient and capable handling of the affairs of the Society; and to those who have contributed interesting and valuable papers and discussions to the program, making this session one that will be memorable in the annals of the Society.